

Changes in the drylands of Eastern Africa: understanding and mapping livelihood dynamics and resilience within pastoralist systemsⁱ

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Abstract

While there is increasing conceptual clarity in the literature on the meaning of resilience, translating this into appropriate and practical policy and programming approaches and interventions remains challenging. In this paper we argue that a taking *longitudinal perspective* to uncover extended periods of poverty, vulnerability and wealth, and a *focus on systems* to map the connectivity of different actors and variables across scales, will facilitate the next critical step from resilience theorising to observing and measuring real change. This paper examines the implications for resilience programming of change over time happening in five pastoralist systems in eastern Africa: Maasai system in Kenya's South Rift Valley, Somali region of Ethiopia, Borana Plateau in southern Ethiopia, Karamoja in northern Uganda, and Northern Bahr el Ghazal region in South Sudan. We present evidence of these changes and propose an approach – Pastoralist Livelihood Systems Analysis – to understand longer-term pathways for pastoral livelihoods and their consequences for poverty, vulnerability and resilience. This approach can provide researchers and policy makers with a richer, more grounded and relevant understanding of dynamic change and vulnerability in each system and thereby improve support and interventions in these areas.

Keywords: Pastoralism, systems, resilience, East Africa, livelihoods

Introduction

In recent years resilience has become a critical concept for designing and implementing policy and programming approaches to support and strengthen the livelihoods of people living in the drylands of eastern Africa. Put simply, resilience refers to the ability or the capacity of individuals, groups of people, organisations, institutions, or systems to deal effectively with shocks and stressors (Béné et al., 2015, p. 11). Resilience refers not only to the capacity of a system to absorb shocks but also to its abilities for renewal, reorganisation and development (Folke, 2006). Recent thinking on resilience further distinguishes between different, interlinked capacities – absorptive, anticipatory, adaptive and transformative – that enable people to function well and successfully manage shocks and stresses (Bahadur et al., 2015). Increasingly it is recognised that resilience is not the final programming outcome but rather the means to support better well-being and livelihood security (Béné et al., 2015). Thus, strengthening resilience is about expanding competencies to manage change at all levels with the purposes of providing clear benefits for individual and collective well-being.

While there is increasing convergence in the literature on what is meant by ‘resilience’, translating this into appropriate and practical policy and programming approaches remains very challenging. The very nature of resilience implies that it is inter-sectoral, requiring coordinated planning and interventions across multiple levels of governance, and over time. Operationalising resilience is made more difficult in contexts of dynamic change, in which the levels and combinations of capacities needed to facilitate resilience may themselves shift markedly in response to volatility or rupture happening in wider systems – ecological, economic, political, and security. The tendency to focus on recent trends and current conditions can also obscure a clearer understanding of longer-term dynamics influencing what is needed to strengthen resilience. New, grounded insights are necessary to turn resilience thinking into practical action. A *longitudinal perspective* to uncover extended longer patterns in poverty, vulnerability and wealth, and a *focus on systems* to map the connectivity of actors and variables across scales, will facilitate this critical step from resilience theorising to observing and measuring real change.

In light of the above, this article examines the implications for resilience programming of change over time happening in eastern Africa drylands, with a specific focus on pastoralism. It presents evidence and data of these changes, as well as an approach (***Pastoralist Livelihood Systems Analysis***) for understanding longer-term pathways for pastoral livelihoods and their consequences for poverty, vulnerability and resilience. We draw upon and elaborate a simple conceptual framework for understanding broad trajectories of change within pastoralist systems. Specifically, the article focusses on dynamics of change occurring since 2000, when a severe drought greatly affected the region’s pastoral areas. Since then, different pastoral areas of eastern Africa have experienced further droughts as well as other shocks, including the 2011 regional drought crisis that tipped many into a situation of deep food insecurity. The crisis prompted renewed efforts to identify approaches to more effectively address poverty and vulnerability, and strengthen resilience in pastoral areas.

At the same time, drylands of the region have become newly important in national economic development strategies, particularly in Ethiopia and Kenya, with considerable new investment in infrastructure and resource development happening in these areas. While governments and investors trumpet the potential of these investments to lift the livelihoods of dryland populations, the outcomes of these changes are unclear for small-scale livestock units and the small-town poor. They may, in fact, constitute a new type of stressor in places where investment hastens land and resource grabbing, creating new restrictions on resource access. It is critical that all actors –

governments, donors and private stakeholders – working in these regions have an informed understanding of diverse dryland livelihoods, their trajectories of change over time and the outcomes of these for different groups and individuals. Given the paucity and patchiness of data – particularly longitudinal data – from eastern Africa’s drylands, this article proposes a way forward for more joined up and relevant data collection and policy analysis.

A Systems Approach

The article adopts a focus on *pastoralist systems*. These refer to a production systems centred on the rearing, marketing and trade in livestock and animal products. However, a pastoral system encapsulates a broad range of non-livestock livelihoods and productive activities existing in drylands, as well, which nonetheless may be associated with pastoralism through a variety of social and economic relationships. Pastoralist systems have experienced dynamic changes – economic, social, political and environmental – as well as intensifying ties to the region’s political and commercial capitals, international markets, and a global diaspora. Importantly, these changes are evident in the fact that the nature and magnitude of pastoral systems today is not a linear function of the number of pastoral herding households, or their livestock holdings (Kratli and Swift, 2014), but a much wider constellation of pastoral peoples no longer focussed purely on livestock-keeping, as well as actors in a wider political economy who have invested in drylands.

Different livestock-based production systems have emerged in varying political-economic and socio-ecological settings in the drylands, underlining the importance of understanding *trajectories* – or changes over time – in particular places. Today, varieties of pastoralism include commercialised forms of livestock-keeping oriented to large domestic and regional export markets; smaller-scale livestock-keeping for subsistence and local marketing combined with farming and other rural activities; the maintenance of very few small-stock in and close to towns, alongside other non-livestock activities; and herding based on long distance movements, key resource use, and maintaining a network of associates through which to exchange livestock and labour as the basis for mitigating risk.

The work conducted to inform this article focused on five pastoralist systems (see Map 1): Maasai system in Kenya's South Rift Valley, Somali region of Ethiopia, Borana Plateau in southern Ethiopia, Karamoja in northern Uganda, and Northern Bahr el Ghazal region in South Sudanⁱⁱⁱ. These systems were purposely identified because they are emblematic of some of the broader trends (and outcomes of these) influencing diverging trajectories for pastoralism in the region:

- The Somali Region of Ethiopia is part of a wider ‘Somali export zone’ crossing into Somaliland and Puntland. Here pastoral systems have changed from traditional mobile pastoralism toward commercialised forms of livestock-keeping that feed export markets; others have exited into low return economic alternatives.
- On Ethiopia’s Borana Plateau, many pastoralists have shifted from traditional pastoralism into smaller-scale commercialized livestock-keeping, most recently of goats and sheep, while many have turned to rain-fed cultivation of small plots.
- The Maasai system in Kenya’s South Rift Valley has transformed in a variety of directions over the past 100 years, with change intensifying since the introduction of group ranches in the 1970s. Land commercialization, rather than livestock commercialization, has changed the face of pastoralism, with many exiting into low return activities, while a small minority have benefitted immensely from the sub-division of rangelands and conversion of key

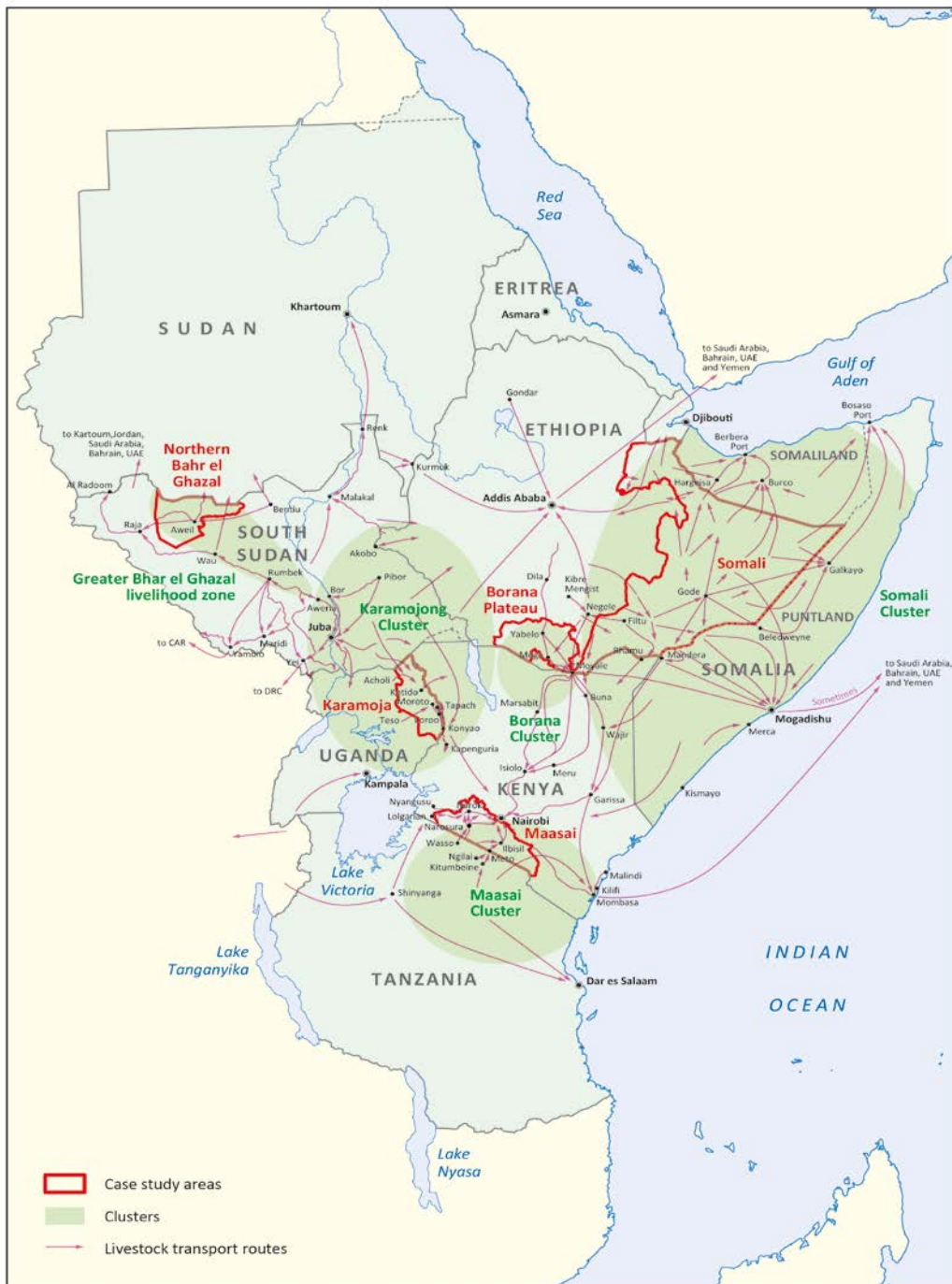
resources into other uses, including the establishment of flower farms supplying European markets.

- Many have remained in traditional pastoralism or small-scale agro-pastoralism in the Karimojong Cluster encompassing Karamoja in Uganda and Turkana in northwestern Kenya. Yet, many have exited livestock-keeping, surviving through their involvement in a host of tasks-for-cash through which they generate meagre amounts of income and livelihood.
- Customary forms of livestock-keeping are widespread in the northern Bahr el Ghazal region of South Sudan. However, many have also connected into wider systems of livestock trade and marketing, largely in cattle. The impacts of continuing armed conflict mean that many others have lost many livestock, shifting into other subsistence activities and survival work.

These systems reflect very different trajectories of pastoralism in the region, which in turn relate to varying access to markets and resources and the nesting of these in diverse political-economies and ecological and socio-cultural systems. Further, within pastoralist systems there are starkly different options for individuals and groups defined by age, gender, wealth and ethnic/section affiliation. Diverging pathways across and within pastoralist systems highlight the challenges of programming to reduce vulnerability and strengthen resilience.

Our method relies on a comprehensive review and synthesis of existing secondary evidence and literature, as well as an exercise to map available data sets. More than 400 documents were retrieved by formal literature search using a number of databases complemented by manual back-searching, as well as by snowballing techniques to identify additional literature. Key informant interviews were also carried out with experts on different pastoralist systems and themes, to point to other documents. The search was narrowed to documents produced since 2000, and relating to the five systems referred to above. Further, more than 100 datasets were reviewed to map what data is available that can provide insight into the dynamics of change over time, and their outcomes.

Drawing on our extensive review of the literature in the next section we present evidence of trends and drivers of change in eastern Africa drylands, as well as the implications of these for pastoral livelihood pathways. We then present a conceptual framework upon which to build the Pastoralist Livelihood Systems Analysis approach. Following this, we present the steps that can be followed to understand the context and drivers influencing options and opportunities for strengthening resilience. The concluding section considers the implications for resilience policy and programming in pastoral areas of eastern Africa.



Map 1. Pastoralist systems covered by the study and livestock flows in eastern Africa

Sources: Map adapted from Simpkin 2005, McPeak and Little 2006, Majid 2010, Gertel and Heron 2011, ICPALD 2015.

Pastoral systems past and present

Customary pastoral systems in eastern Africa

Over the past several decades, the drylands of eastern Africa have experienced tremendous change and transformation. These areas are home to some of the largest pastoralist populations in the world that are still active in livestock-based production systems, and pastoralism remains the most productive use of most of the region's drylands. The physical distribution of grazing resources in drylands is uneven, with many concentrated in key areas such as along rivers or on hilltops, as well as determined by episodic and uncertain rainfall. The region's pastoralist systems evolved to incorporate adaptive mechanisms for managing resource variability and uncertainty. Through the *mobility* of herds and people across low-productivity dry rangelands, for example, pastoralists were able to support mixed-species herds by knitting together the use of separate, distinct pockets of key resources (Westoby et al., 1989; Scoones, 1994; McCabe et al., 1999). The effectiveness of herding strategies depended on the *flexibility* of pastoral units to seize opportunities and evade hazards in highly variable and uncertain rangeland environments. The logic underlying herders making decisions independently was that they could decide the movement of their herds and how to expend available labour to care for livestock to optimise use of fluctuating rangeland resources (McCabe, 1983). Pastoralist systems have long exhibited a boom and bust cycle (Dahl and Hjort, 1979). Thus, pastoral production strategies aimed to keep larger herds to help ensure a reliable flow of livestock products and services by investing during 'good years' as well as keeping extra animals as insurance when conditions deteriorated (Livingstone, 1991).

In the past and often up until now, states in the region have frequently regarded pastoralism to be an anachronistic way of life, harbouring little economic value, and threatening environmental ruin and disaster. In the agrarian-dominated political systems of Ethiopia, Kenya and Uganda, successive governments sought unsuccessfully to push pastoralists into becoming full-time farmers, ranchers or petty traders. The perception that pastoralism contributed little to wider economic output, and that drylands were of 'low potential', justified a glaring bias in the allocation of public resources in favour of 'high potential' agrarian highlands, which in Kenya were acquired by white settlers with access to large amounts of capital (Leys, 1975).

Yet, in spite of these perceptions, pastoralist systems generated significant wealth from environments that could not sustain many other economic activities, and were closely integrated with other land uses. Pastoralists maintained substantial social and economic ties with other livelihood groups in drylands, including fisherfolk, hunters and gatherers, and farmers (Waller, 1985; Sobania, 1991; Spear and Waller, 1993). These ties helped pastoralists to engage in a range of non-livestock activities to complement and support livestock production, including flood retreat farming, irrigated agriculture, hunting and gathering of natural products, marketing and trade, and even fishing. Pastoralist systems were also often linked to wider systems of marketing and trade. Thus, for example, before the outbreak of civil war, and even still, Somalia was the largest exporter of goats in the world.^{iv}

Over time, pastoralist systems in eastern Africa have been redefined as they have become increasingly bound into processes of state territorialisation and wider dynamics of trade and investment. These changes are apparent in a number of distinct, longitudinal trends in drylands. Evidence of these is assessed in the following section.

Trends shaping east Africa's pastoralisms

Arguably the most significant trend redefining pastoralism in east Africa is the fragmentation of rangelands through processes of excision, privatisation (often taking the form of enclosures) and commodification of rangeland resources (Western and Nightingale, 2004; Mwangi, 2007; Galvin et al., 2008; Homann et al., 2008; Flintan et al., 2011; Galaty 2013; Nunow, 2013; Abbink et al., 2014). Rangeland fragmentation directly threatens adaptive processes in customary pastoralist systems, as movements become more difficult to make and key resource areas are fenced and set aside for non-livestock uses.

Rangelands have been carved up through the establishment of private enclosures, water points and cisterns, 'farmlands', ranches, and conservation areas. Some fragmentation has been driven by state investment in large irrigation schemes. Successive governments in Ethiopia have expanded industrial agricultural estates in the Awash Valley for producing cotton and sugar, even though per hectare returns for pastoralism are higher than for industrial crops (Behnke and Kerven 2013).^v Elsewhere, governments excised large riverine areas to establish irrigation schemes that are meant to provide pastoralists with alternative livelihoods. These were established at great cost, but often had disappointing results. For example, in the 1970s the UNDP and FAO supported a number of schemes in Turkana, investing up to \$62,000 per hectare or \$21,800 per tenant (Hogg, 1987), but these fell into a state of disrepair barely ten years after being introduced (Lind, 2007). While there are many examples of failed state-led, donor-funded large irrigation schemes in eastern Africa drylands, privately-led community-based and profit-oriented smaller-scale irrigation activity has spread across the region, driven by an indigenous entrepreneurial class. Examples include along the Wabe Shebelle River in Ethiopia's Somali Region, and in the Mander triangle. Sandford (2013) estimates that the total extent of the irrigated lands involving pastoralists in the Horn of Africa at 120,000 hectares. However, plot sizes typically are very small at around 0.25 ha/household; further, dryland farming remains a high risk activity in many dryland areas, and for most is not a reliable substitute for livestock-keeping.

Rangeland fragmentation is also hastened by internal processes of sedentarisation and resource claims-making in pastoral societies. Across eastern Africa, regional drought and livestock disease epidemics in the early 1980s pushed many pastoralists to settle permanently and seek alternatives to livestock keeping. The Borana increasingly turned to crop cultivation following the 1984/1985 drought as well as began fencing commonly used forage banks (*kallo*) (Homann et al., 2008: 511). In the South Rift region in Kenya, the establishment of group ranches, supported by the state and World Bank, set in motion the individualisation of land tenure, and the carving up of the rangeland as many poorer Maasai sold their plots to a variety of local and outside investors. The presence of group ranch institutions and tenure facilitated permanent farming and sedentarisation of Maasai herders, who nonetheless cultivated as a way to rebuild herds. In In Loitokitok Division of Kajiado, the land under till expanded from 7500 hectare to almost 30000 between 1973 and 2000 (Campbell et al., 2003 in Wangui 2008: 372). This is one of many examples where sedentarisation through enclosure has resulted from a combination of state intervention and local efforts to enclose and commodify the commons (Korf et al., 2015).

Sedentarisation has occasioned the greater need for basic services and markets for trade and exchange, helping fuel the growth of small towns. In recent years, Garissa in Kenya's arid north-east was the country's fastest growing city (Little, 2014). Dadaab, also in Kenya's north-east, hosts the world's largest refugee camp, and now ranks as Kenya's third largest city.^{vi} Jigjiga, the capital of Ethiopia's Somali Region, expanded from a small regional centre in the 1990s into a prosperous mid-sized town with a population approaching 150,000. A variety of factors have driven small-town

growth in the drylands. Food insecurity and famine precipitated large-scale settlement in and around relief distribution centres in many parts of the region, such as Gode in Ethiopia's Somali Region, as well as Aweil in Northern Bahr el Ghazal, which has grown to more than 100,000. International humanitarian operations in these places have helped to establish critical infrastructure and services for local populations.

In recent years, indigenous capital and state investment have encouraged more dynamic growth in dryland towns. Capital investment by local and transnational Somali merchants in Jijjiga and other towns in Somali Region has accelerated sedentarisation (Korf et al., 2015). In Karamoja, a rental market has expanded rapidly as well-off Karamojong construct housing for recent migrants. After decades of comparative neglect, eastern Africa's drylands are on the receiving end of an unprecedented surge of investment. Ethiopia's infrastructure spending as a percentage of GDP is now the highest in Africa. Road building and repair has been the major emphasis of this infrastructural push. Likewise, in Kenya, the \$135 million Isiolo-Merille-Marsabit-Moyale road, to be finished in 2016, will be the first major project completed under the Lamu-Port-South Sudan Ethiopia Transport (LAPSSET) Corridor. Road tarmacking and street lighting in Lodwar, Isiolo and Wajir by newly-established county governments were funded from devolved Kenyan Treasury resources, as well. Here again, indigenous capital is intersecting with state investments to produce dynamic results. In Kenya's Tana Delta region, the expanding use of motorbikes, as public transport is doing much to improve the flow of people and small goods alongside the operators of small boats that cross the many inlets and tributaries dissecting the delta (Nunow, 2013).

Improvements in roads and concomitantly in transport services (ranging from public buses to lorries and motorbikes) are making markets and basic services more accessible for dryland populations, while also supporting the penetration of outside capital. Yet, while these investments represent a welcome renewal of interest by states in drylands and an opportunity to reduce long-standing inequalities in the provision of public goods and services, the outcomes of capital projection in drylands can be ambiguous. McPeak and Little (2014: 67) observe that, 'While transport improvements can create new opportunities for more price responsive marketing and value added processing, it is by no means clear that the benefits to the majority of dryland residents will outweigh the costs, if current trends continue.' Examples abound in the region of land and resource grabbing in the drylands, or of pastoralists making ill-informed sales of individual land holdings. A land rush in South Rift driven by speculators spurred by the area's proximity to Nairobi, and Maasai distress sales, has seen the rangeland become highly fragmented as the area transitions into a peri-urban frontier. This has left many Maasai worse off through a process that Maasai explain as 'selling wealth to buy poverty' (Rutten 1992; Mwangi 2007). An economic rush in Ethiopia's Somali Region, incentivised by transnational marketing networks, has seen the rapid commodification of pastoral resources such as charcoal, water points and cash crops (Korf et al., 2015). In Harshin, traditionally an important drought grazing reserve that lies on a strategic trekking route for livestock being exported through Berbera, there has been a near total privatisation of grazing areas and water as the rangeland was carved into household plots for farming and private grazing (Flintan et al., 2011).

Infrastructural upgrades and extensions in the drylands are helping power further expansion of formal livestock exports, particularly from Ethiopia which has experienced unprecedented growth in exports over the past decade. The main supply areas are Borana for cattle and chilled sheep and goat carcasses, and Somali Region for live camels, sheep and goats (Aklilu and Catley, 2014). Even before infrastructural improvements in Ethiopia and Kenya's drylands, the region was connected to a larger regional livestock marketing and trade. Much of this was informal, and today the volume annually of informal cross-border livestock trade accounts for considerably more trade than the

official export trade (McPeak and Little, 2006; Little et al., 2010). Further, the informal trade between Ethiopia and Somaliland feeds approximately 50% of the small stock exported from Berbera and Bossaso, most of which are sourced from eastern Ethiopia's lowlands (Majid, 2010; Eid, 2014). Pastoralists have also responded to increasing domestic demands associated with the high and increasing human populations in urban areas, and rising purchasing power among some consumers (McPeak and Little, 2006; Hussein, 2013; Aklilu and Catley, 2014).^{vii}

This positive picture of dynamic economic change in the region is tempered by concerns around the potential impacts of climate change, a prominent theme in many resilience studies. However, rainfall trend-lines in the region are varied and contradictory (Devereux, 2006; Catley and Aklilu, 2013). Projections of changes in future annual rainfall are uncertain, with differences in projections for countries as well as regions within these. Still, local perceptions in many pastoral areas are that drought conditions are worsening. Nonetheless, these perceptions often take into account variables other than rainfall including land use change, resource availability and other factors related to risk in pastoral systems (Little et al., 2001b).

Partially overlapping and conflicting claims to land today compound a situation in which pastoralists must negotiate or clash over diminishing access to key resources. While negotiations are often the primary and effective method for managing contested resources, particularly in times of drought, political divisions can drive conflict. For many years, a proliferation of small arms in the region has increased the opportunity for conflict to lead to violent and fatal clashes (McPeak and Little 2014), as evident over many years of chronic, low-intensity conflict in Karamoja as well as in Turkana (Lind, 2015).

While livestock raiding continues in many parts of the region, the nature of 'pastoralist' conflicts is becoming more complex and subsumed within struggles for political-administrative control. These new-type of conflicts sometimes take the cover of 'livestock raiding', even though their primary motivation has little to do with acquiring animals. Intense competition in parts of Ethiopia and Kenya pivot around control of sub-national political offices – in contexts of federalism in Ethiopia and decentralisation in Kenya – and access to public resources that these guarantee (Hagmann and Mulugeta, 2008; Boye and Kaarhus, 2011). Owing both to the fact that pastoralist areas are being subsumed in ever more complicated governance arrangements, and the increasing influence of various transnational actors and flows (in guns, in lucrative commodities, in militants, in global capital investments in drylands), customary structures and central governments alike are less able to manage the dynamics of conflict and violence happening in pastoral areas.

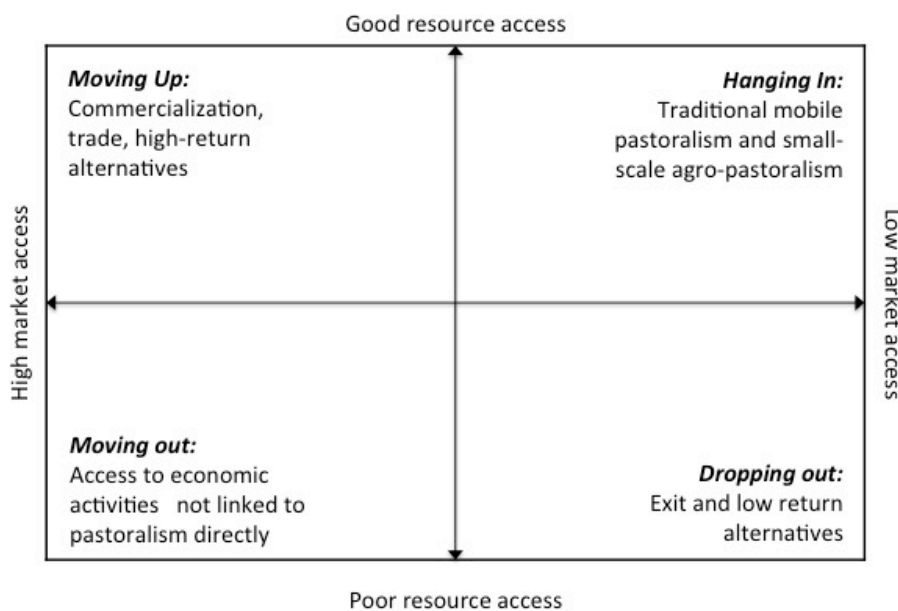
Conceptual framework for understanding change: Diverging pathways and prospects for east African pastoralists

As discussed above, livelihood transformation and changes in this dynamic context are complex, yet also contradictory. Increases in rangeland fragmentation, sedentarisation, small town growth, commercialisation, and infrastructural investment are all changing access to resources and markets in the drylands. These changes are shaping livelihood choices, constraining some livelihood pathways and others.

Figure 1 below presents a schema for thinking broadly about change over time in pastoral areas. It adapts a similar model developed by Catley et al. (2013). It draws on Dorward (2009) who contrasts

pathways of stepping up (accumulation and improving income), stepping out (diversification) and hanging in (getting by through mix of local production, labour and off-farm work). Mushongah (2009) adds a fourth pathway, dropping out, to describe those who are destitute, reliant on relief aid or who are migrating away. Figure 1 uses two axis depicting level of access to resources and access to markets to illustrate four pathways for pastoral livelihoods in the region: some are *moving up* into commercialisation, regional and export livestock trades, and other high return economic activities, others are *moving out* into activities not linked to pastoralism directly but that may nonetheless be linked to livestock-keeping through various feedback loops and value added diversification activities, some are *hanging in* traditional mobile pastoralism and small-scale agro-pastoralism, while many more are *dropping out* or exiting into a range of tasks-for-cash and other low-return economic activities. These categories constitute one layer of the Pastoralist Livelihood Systems Analysis presented in the following section.

Figure 1. Pastoralist livelihood pathways in eastern Africa



Areas and people with good natural resource access and access to markets, are *moving up*, because, amongst other things, they are able to maintain and sell livestock and their products as a successful business enterprise, commercialising the milk and livestock trade, selling in high export zones, creating private abattoirs and finding lucrative business opportunities along the livestock value chain. The estimated value of the regional trade in livestock and meat was US\$1 billion for the Horn in 2010 (Catley et al., 2013). Pastoralists moving up are particularly evident in the high-export zones of Ethiopia’s Eastern lowlands, which historically keep many cross-border trade and exchange relations with neighbouring areas of Somaliland, Puntland and Somalia (Catley and Aklilu, 2013). Yet, the ripple effects of this trade are wide, extending into northern Kenya, where livestock-keepers increasingly supply camels through Moyale-based traders to the regional trade (Mahmoud, 2013).

This trade is spurring local initiatives, such as the emergence of private abattoirs in pastoral areas of Somalia and Somaliland, as well as a diversity of marketing and service provision relationships.

Areas and people with good resource access, to rangeland and water sources in particular, but who do not have high market access are **hanging in**, practicing customary forms of pastoralism based on high mobility, banking on extended social rites, and opportunistic use of key resource patches within the wider landscape. Examples of customary pastoralism can be found throughout the region, from Karamoja and Turkana, to Borana areas of northern Kenya and southern Ethiopia, and in parts of Ethiopia's Ogaden region. However, in general, levels of pastoral mobility are declining right across eastern Africa.

Rangeland fragmentation is constraining traditional mobile pastoralism because pastoralists are less able to access the key resources that are needed in periods of drought. When a pastoralist's herd is no longer viable due to lack of good resource access, the household exits pastoralism, or **drops out**, at which point household members seek productive activities not directly linked to herding. There is of course nothing new about pastoral people taking steps away from mobile livestock-keeping toward alternatives. Yet, the context in which people leave pastoralism is qualitatively different today. Some dropouts remain closely linked, though stockless, and still consider themselves to be pastoralists (Teshome and Bayyissa, 2014).

A further category relates to areas and people who elect to pursue economic activities that are not linked to pastoralism directly but have good market access, **moving out**. The opportunity to step out of pastoralism into 'value added diversification is limited to those able to take advantage of resources to have high return on their activities. However, small town expansion, better connections with larger centres and the younger generation's acceptance of non-traditional livelihoods are enabling those relatively few people to earn a living from the pastoral economy without herding animals. Examples of moving out include the expansion of micro-dairying operations in towns, the collection and sale of fodder to town dwellers, and marketing in hides and skins. Some pastoralists are organising themselves to supply milk to the populations of fast-growing small towns and larger centres in the pastoral areas, but, also to those who out-migrated and reside in cities such as Nairobi, Addis Ababa, and even London (Mahmoud, 2013).

While pastoralism remains the most productive use of most of the region's drylands, indigenous pastoral production systems have come under immense pressure in recent decades. A basic conundrum is that vulnerability and poverty seem to worsen even while economic growth abounds, commercialisation processes gallop apace, and the region's remote margins become increasingly tied into wider systems of market activity, trade and investment. The pastoral poor – those who have dropped out – live in the shadow of the region's livestock boom and its intensifying economic integration, excluded from the possibility of benefitting from commercialisation like those who are moving up and out, much less able to return to a leaner form of traditional livestock-keeping (Aklilu and Catley, 2010). The breadth and depth of vulnerability were evident during the 2011 drought crisis, which affected nearly 10 million people in Somalia, Kenya, Ethiopia and Djibouti.

Resource Access

A sizeable and growing proportion of the population in pastoral areas – those who have dropped out – is chronically vulnerable and lacks clear alternative livelihoods. Per capita livestock holdings have dropped sharply in most parts of dryland east Africa (Little et al., 2001a; Lybbert et al., 2004; Devereux, 2006; Desta et al., 2008), to the point that holdings now fall far short of subsistence requirements for a large proportion of pastoralist populations. The ratio of cattle per person in

Borana declined from 1984-1999 from an average of 4.1 head of cattle to 2.25 head of cattle (Homann et al., 2008: 506). In Kenya's South Rift Valley, while overall cattle and shoat numbers rose between 1973 and 2001, per capita holdings had fallen to 4 already in the 1980s, a trend that has continued (Western and Nightingale, 2004). While the pastoral caloric terms of trade and potential for more value added processing means it is not automatic that smaller herd size maps into lower human well-being, this has been the experience for many.

Higher livestock mortality rates are driving a decline in herd sizes (Headey et al., 2012: 7). Between 1980 and 2000, Borana suffered three major droughts in which pastoralists lost 35-67% of their livestock inventory with a monetary value worth hundreds of millions of dollars in USD (Desta et al., 2008: 5). The Maasai in Laikipia felt the impacts of a drought in 2009-2010 so severely that some began referring to it as *Olamei Oodo* or 'the Great Drought' (Lind and Barrero, 2014). One estimate is that 64 percent of cattle herds and 62 percent of sheep were lost (Zwaagstra et al., 2010). These losses happened in spite of the fact that six stations in northern Kenya monitored by the Kenya Meteorological Department reported higher rainfall deficits during droughts in the 1980s and 1990s than in the two years preceding the crisis that pushed the Maasai to migrate to Mt. Kenya in 2009.

High livestock losses have resulted in a downward shift in the distribution of households between those considered in local terms to be wealthy, middling, poor and destitute (Morton 2006 in Desta et al., 2008: 5). Desta et al. (2008), who chart the downward trend of pastoral drop-outs in Borana, found that while a majority were already poor before moving to towns, between one-third and half were either middle or better off, indicating they were unable to recover from livestock losses. With livestock poverty deepening for many pastoralists over a long period, there has been a shift to keeping livestock that are more marketable, particularly small stock that can be easily disposed of to meet cash needs. Having a small herd also makes it difficult to build back, as small herds milked intensively experience lower calf growth and survival when pasture is scarce (Western and Nightingale 2004: 23). In contrast, wealthier households – those who are moving up – are able to leave more milk for livestock to consume, resulting in better calf health (Holden et al., 1991 in McPeak and Little, 2014: 56). Further, with the privatisation of rangeland resources, and increasing fragmentation experienced in many eastern African rangelands, it is necessarily more difficult to support livestock if you can get them. This is complicating pathways out of poverty: opportunities are shrinking to climb back into livestock keeping if you have dropped out when access to key grazing resources becomes ever more constrained.

Market access

Most pastoralists who have exited livestock-keeping are destitute and survive by knitting together meagre amounts of income and livelihood derived from various tasks-for-cash, informal social support and occasional relief assistance, usually in the drylands' expanding towns and urban areas. Evidence points to increased impoverishment and destitution of pastoralists who settle (Adano and Witsenberg, 2005). Further, pastoralists' human health is negatively correlated with the degree of their sedentarisation. Fratkin and Roth (2005) compared the health and nutritional outcomes of sedentarisation, comparing five Ariaal and Rendille communities in a drought year and a normal year. They found that children in sedentarised communities showed three times the level of stunting (measured by height by age) and wasting (measured by weight by age) than the nomadic community. McPeak and Little (2014: 62) also find that those who are hanging in mobile livestock systems have lower sensitivity to human illness.

In spite of there being evidence of comparatively poorer nutritional and health outcomes for sedentarised pastoralists in many places, settling in and near to towns has advantages in offering

access to livelihood activities that do not depend on having herds, as well as proximity to local markets and services. This has been the experience of pastoralists who are moving out into value-added diversification. In Borana areas of northern Kenya, households with better access to markets and infrastructure had higher and more diversified incomes (McPeak and Little, 2006) and those who combined livestock-based livelihood with cash income had the highest level of wellbeing and the least vulnerability (McPeak, Little and Doss 2012: 171). In southern Somalia during the 2011 famine, one in three households had adequate market access during the crisis and were more likely to maintain or recover adequate food security (Mercy Corps, 2013: 5).

In summary, dynamic change in the region has resulted in differentiated outcomes for different systems in the region as well as for individuals and groups within these. While some benefit greatly from expanding trade, marketing and opportunities for commercialisation, a larger proportion of dryland populations continue to struggle to make a living. The dynamics of intensifying commercialisation in the region, happening alongside large new infrastructural and agricultural investments, are exclusionary, as wealth is becoming even more concentrated amongst the better-off who are well-positioned to grasp new opportunities. The implication is that vulnerability is not something static but, rather, is a dynamic and constantly changing state. These dynamics are defining of the challenge for programming and interventions intended to expand the resilience capacities of poorer and vulnerable individuals and groups. The following section proposes and explains a simple framework, consisting of three layers of research and analysis, to understanding pastoralist livelihood systems and complex changes happening in these over time.

Pastoralist Livelihood Systems Analysis: a method for understanding change over time in pastoral drylands

This section details the elements and steps of the Pastoralist Livelihood Systems Analysis, our proposed approach to analyse the dynamics and impacts of change over time in pastoralist systems. Specifically, this provides a method for: i) mapping a system in a holistic way that draws on, and combines, internal and external system meta-level influences as well as livelihood profiles at the intra-system level (group and household) level and; ii) identifying changes and understanding resilience trajectories for livelihood groups within the system. This is a crucial step towards future efforts to map and understand change in dryland eastern Africa, and subsequently to provide appropriate support to policy, markets and provision to changing pastoralist systems in these areas. The Pastoralist Livelihood Systems Analysis consists of three layers of evidence and data gathering and analysis, as described below.

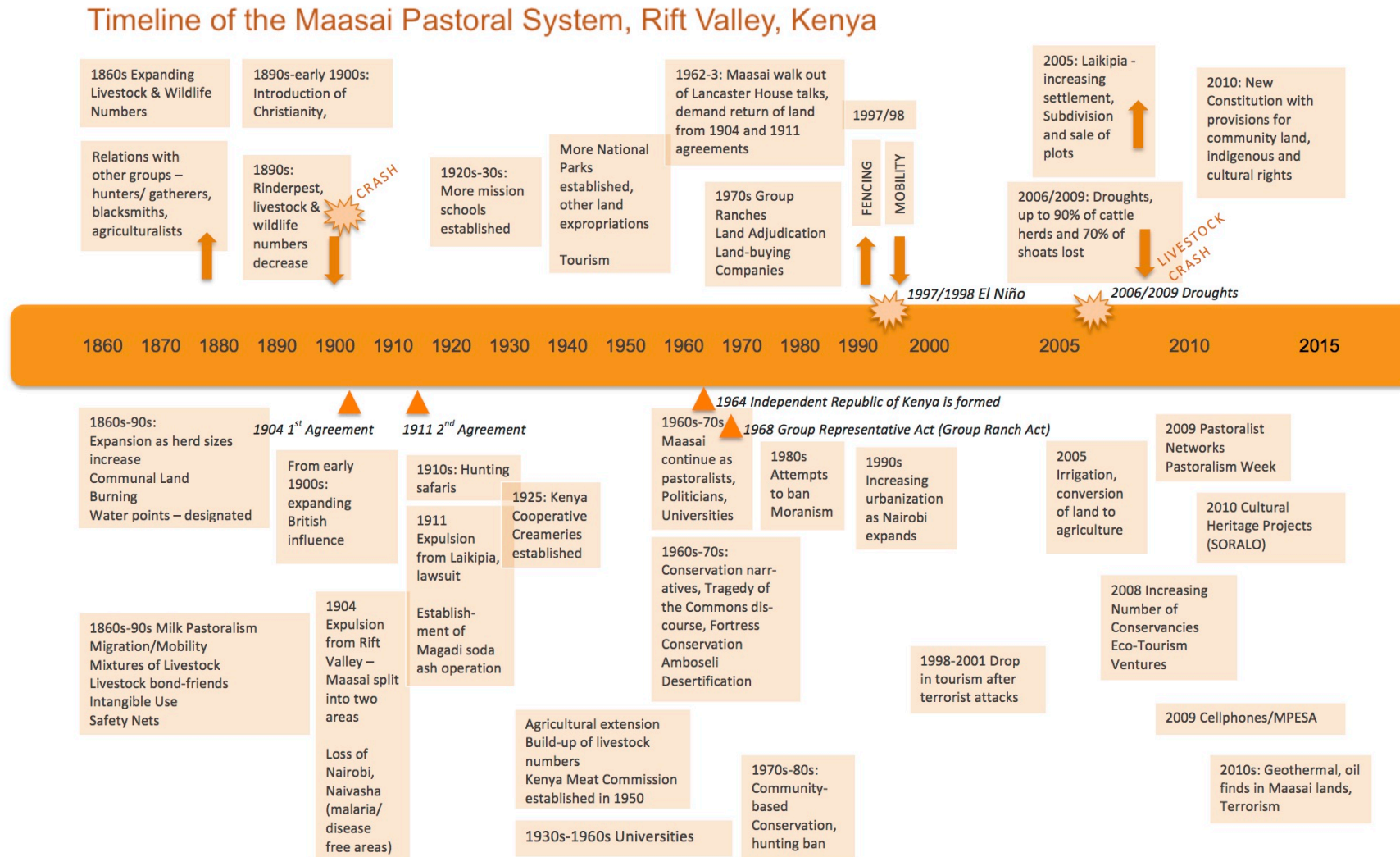
Layer 1: System/context analysis

Mapping a pastoralist system necessarily requires information that can describe a complex layering and network of relationships, influences and dynamics. On the one hand it is important to understand the structure of the system itself, how it relates to, interacts with and depends upon other systems and how it is, in turn, influenced by other systems and external factors. We describe this layer of analysis as a system-level analysis. The system itself has a path dependency that is reflected in the evolution and balance of the range of livelihoods pursued and social dynamics inherent to the system. Yet it can be (more or less) manipulated by policy decisions made at supra-system level or by covariate climate, economic or conflict shocks.

To contextualise a system, one can draw on the synthesis of existing evidence including interviews with key experts in the field and a mapping and analysis of meta-level data and indicators, ideally over time. These together provide an understanding of the shape and context of the system as it currently exists but also a view of how it has evolved and may continue to adapt or change over

time. For a long-view of the system and change over time, a timeline, such as the one in Figure 2, below, can be developed to illustrate key events and trends that have influenced production systems and livelihoods.^{viii}

Figure 2. Example of timeline analysis to be performed on pastoralist systems



As a complement to this, meta-data can be drawn upon to provide both a static (current) and dynamic (where data is available at multiple points) contextualisation of the socio-economic and ecological influences on the system. The most promising and comprehensive source of empirical data and indicators that currently exists are the IGAD Member States Baselines. HABITAT INFO and ILRI on behalf of the Technical Consortium for Building Resilience in the Horn of Africa, a project of the CGIAR, compiled and processed over 450 datasets and indicators into a database and mapped them onto a GIS platform (Busby and Smith, 2014; Chesterman and Downie, 2014). The indicators are characterised as ecological, social or economic, and many are aggregate-level indicators from national level datasets such as DHS data, MDG indicator data, national poverty data, climate protections and others data that combine observable characteristics with projections.

Moreover, existing secondary evidence and data-sets, particularly those that are longitudinal, can be assessed to determine access to resources and markets as fundamental indicators to define and distinguish between different types of pastoralist systems. Specifically, the four different pathways for pastoral livelihoods in eastern Africa discussed above (Figure 1) can be identified depending on access to resources (a continuum of good to poor) and markets (a continuum of high to low). Armed with a deep review of the evidence it is possible to adapt this model to develop an understanding – in a general sense – of the broad contours of a pastoralist system today: the context, structure, and trends (in policy, climate, economy, demography, land and resource access, conflict) shaping current conditions and options.

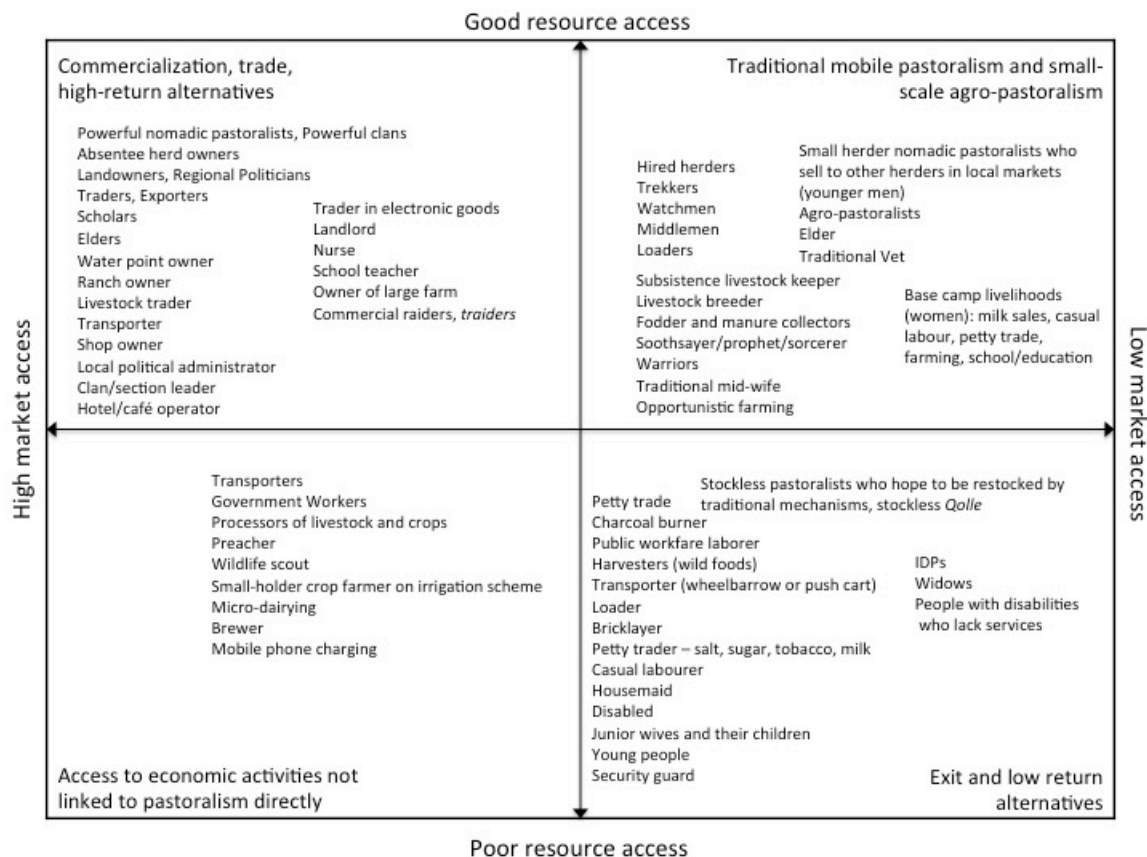
Layer 2: Mapping livelihoods of households and individuals within a system

As with any conceptual framework, Figure 1 conceals enormous variation and nuance in the situation of pastoralist systems across the region. Figure 2 illustrates a much more detailed mapping of the range of livelihoods, drawing on a thorough reading of over 400 documents. While Figure 2 amalgamates livelihood and economic activities from across different pastoralist systems, the figure will be differentiated for individual system, as we did for each of the five systems detailed in the Introduction above.^{ix} Once the general patterns shown in Figure 1 are disaggregated it becomes obvious that change over time has contributed to significant differentiation within systems, indicated by widening inequality and uneven capacities to bounce back after shocks. For instance, evidence shows that increasing numbers of households in dryland areas have exited customary pastoralism without experiencing any advantages that could be gained from positive diversification – such as are emerging in towns and urban centres (Headey et al., 2012; Desta et al., 2008). Desta et al. (2008) examined the activities of those who have ‘dropped out’ in Ethiopia’s pastoral areas, finding the top activities to be providing daily labour, and selling wood, water and charcoal. Stites et al (2014: 23), who profiled the activities of ‘drop-outs’ in Karamoja, found that the main activities (in order of importance) were casual labour, brewing, agriculture, and domestic service in a hotel, restaurant or private home. Diversification is not only about leaving pastoralism, but rather many use it as a way to remain in pastoralism, as seen in Karamoja where a majority of migrants in towns have retained their links to rural communities (Stites et al., 2014). Diversification among well off pastoralists is an increasingly important livelihood strategy whereby placing a family member in waged employment outside of pastoralism and the rangeland provides capital for reinvesting in the livestock sector (Little et al., 2001a; McPeak and Little 2006).

This more textured understanding of livelihoods and change is central to the second layer of the framework, in which we consider differentiated situations of households and individuals within pastoral systems. While layer one focuses on defining the broad characteristics of a system, and the influences shaping relative market and resource access within this, the focus of layer two is

identifying and plotting different livelihood actors against Figure 1 as a way to develop a disaggregated view of outcomes of change over time, noting that one person may employ multiple economic activities to make a living. By looking at the actors within systems that are moving in different directions, the effect of complex changes that are happening in these areas can be unpacked.

FIGURE 2: MAPPING LIVELIHOOD AND ECONOMIC ACTIVITIES OF DIFFERENT HOUSEHOLDS AND INDIVIDUALS^x



Using relevant datasets it is possible to put numbers and percentages on changes in these trajectories for different groups over time.^{xi} Lind et al. (2016a) detail the datasets that can be used to place numbers and proportions to the figure above.^{xii} From their review, of the 107 data sources available for the five systems covered by this study, there are approximately 45 data sets (cross section and panel) that provide information on a range of household income sources, for instance.

Layer 3: Developing categories to model livelihood change and resilience over time

The findings from layer two can be used to derive empirical categories – livelihood groups – that map onto Figure 1. That is, using empirical indicators of resource access and market access collected at multiple points in time, *change* over time and the *directionality* of livelihoods along the four pathways can be assessed.

A first attempt to empirically classify pastoralist livelihoods and change over time has been developed by McPeak et al. (2012) and then further developed in McPeak and Little (2014). They propose a simple categorisation of four livelihood groups distinguished by their access to the cash economy (a proxy for market access) and livestock assets (a proxy for resources): 'left out' (*dropping out*), 'moving from' (*moving out*), 'staying with' (*hanging in*), and 'combining' (*moving up*) groups. They explain:

One is the lower cash, lower herd-ownership group - the 'left out' group since they have lower access to both herds and the cash economy than the other groups and are the most impoverished group. A second group is the higher cash, lower herd-ownership group, we termed the 'moving from' group. This group resides in dryland areas, but are moving in a direction away from a herd-based livelihood to occupy other niches in the local economy. A third group is the lower cash, higher herd group, labelled the 'staying with' pastoralism but not engaging with the cash economy to the degree seen in their peers. Finally the higher cash-higher herd group, labelled the 'combining group', is strongly involved in both pastoralism and the cash economy relative to the other groups.^{xiii}

These categories relate closely to the four different pathways for pastoralism indicated in Figure 1. Table 1, below, illustrates these categories with the terminology used in Figure 1. The main indicators used to create the livelihoods groupings for the analysis are: herd size (in terms of tropical livestock units TLUs); total income per capita per day; cash income as a percent of total income; total income variability.

TABLE 1. LIVELIHOOD CATEGORIES FOR RESILIENCE ANALYSIS

Livelihood categories for resilience analysis		
<i>Herd size/cash income</i>	<i>Lower cash income</i>	<i>Higher cash income</i>
Lower herd size	Left out (<i>dropping out</i>)	Moving from (<i>moving out</i>)
Higher herd size	Staying with (<i>hanging in</i>)	Combining (<i>moving up</i>)

Source: McPeak and Little (2014)

The advantage of adopting this categorization is three-fold. First, it clearly overlaps with the framework outlined above in that it captures the *directionality* of livelihoods, allowing for analysis of pathways of change. Second, the categorization can be tested empirically using household level data. And third, it can be used to understand resilience.

Using household data gathered on a quarterly basis in Kenya and Ethiopia from 2000-2002, McPeak and Little use the livelihood categories to draw out how different sub-groups in the population are differentially impacted by a range of shocks: climate, health, market and conflict shocks.^{xiv} Their work illustrates how these groups vary in terms of their exposure to shocks, sensitivity to shocks, and capacity to cope with shocks. Specifically, they seek to expound the notion of resilience in pastoral systems by developing alternative measures, contrasting income-based measures to asset-based measures, and measures to assess when households started to bounce back to a common income threshold (Table 2). This work contributes to this study a method to understand the implications of livelihood trajectories for the vulnerability and resilience of different households and groups.

TABLE 2: MEASURING RECOVERY AND RESILIENCE

Measuring recovery and resilience		
Recovery/Interim Resilience Outcome vs. Resilience Outcome	Measure	Outcome
Income based resilience index Recovery	How long does it take for a households to return to pre-shock income level?	'Bounce Back' to income level
Resilience	How long does it take to attain an income above extreme poverty threshold?	Bounce back and build up
Asset based index Recovery	How long does it take for household to return to re-shock asset level?	'Bounce back' to herd/resource size

Resilience	How long does it take household to get to a herd threshold of 4.5 TLUs?	Bounce back and build up
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In order to similarly create livelihood categories for the type of empirical analysis described here, we have identified the following five pairs of datasets can be utilised quickly and at relatively low cost to perform insightful and relevant analysis on changes in pastoralist livelihoods, as well as on resilience of these livelihoods to specific shocks:

- Ethiopia: Borana Plateau: PARIMA^{xv} (2000-2002) and IBLI (2012-2015)
- Northern Kenya: PARIMA (2000-2002) and IBLI (2009-2013)
- Kenya: Maasai South Rift: Homewood, Kristjanson and Trench, Staying Maasai (1998-2004) and Grandin Maasai Systems Study (1981-1985)
- Karamoja, Uganda: Northern Uganda Baseline Study^{xvi} (2004, panel with 2008)
- Somalia: Devereux (2006) and Ethiopia Pastoralist Areas Resilience Improvement and Market Expansion (PRIME) Project Impact Evaluation Baseline Survey Report (2013)

While limitations apply, specifically in relation to the lack of panel data even within the five sets above, further work can build on these existing data sets, applying the methodology outlined above to understand the resilience of different livelihoods to shocks and stressors. Separate resilience analyses should be conducted for different pastoralist systems, and for groups within these who experience varying trajectories of change and capacities to respond. Each separate system may more-or-less be predominantly characterised by one of the 2x2 change trajectories (for instance, *moving up*), but within the system different groups (of households) will have their own trajectories (for instance, *dropping out*, *moving out*). Ideally a method to track change will differentiate between the system level of change and patterns within the system.

Furthermore, indicators will also need to be measured in terms of ‘good’ and ‘bad’ resource access. For each system, and informed by the context analysis and literature review, different indicators will be appropriate. ‘Appropriate’ being informed in large part by the evidence synthesis review. So, for instance, in relation to our more detailed mapping in Figure 2 above, it is possible to identify dominant mixes of resource-dependent livelihoods. The data sources can then be interrogated to decide if appropriate indicators and proxies exist to be able to measure these different livelihood categories. If such indicators exist, then cluster analysis or factor analysis can be used to group households empirically and measure change over time. Clustering different levels of resource-dependency into one composite indicator is beyond the scope of this article, yet will be important as follow up work.

Conclusion

The breadth and depth of vulnerability in dryland eastern Africa, as exemplified by the 2011 Horn of Africa crisis, spurred the recent turn to ‘resilience’ by governments in the region and their development partners. The focus has been on pastoralist populations, in particular, and the apparent need to expand competencies at all levels to manage change with the aim of securing livelihoods and well-being. While the extent of pastoral vulnerability is evident across a range of food security, nutrition and other livelihood indicators, there are diverging pathways for pastoralists in the region, with some clearly benefitting from expanding commercialisation opportunities and enlarging domestic and export livestock trades. Others are exploiting the advantages presented by improving infrastructure, services and communications in and around growing small towns. Yet,

many pastoralists are excluded from dominant growth processes, locked out of opportunities to engage with markets and new outside capital. Many are dropping out. In recent years the greatest focus has been on extending social assistance and public workfare programmes to provide a 'floor' of support for these populations. Livelihoods of the poor and most vulnerable in pastoralist systems are highly differentiated and therefore various combinations of support are required to respond to their specific needs. More imaginative approaches call for a much more granular analysis of the livelihoods of those who have exited full-time pastoralism, but who might still maintain a variety of social, cultural and economic ties with the livestock economy.

In this paper we propose a *Pastoralist Livelihood Systems Analysis* as an approach to understanding the dynamics of change over time and the implications for poverty, vulnerability and resilience. The basis of the approach is a focus on *pastoralist systems* to map connections amongst actors and variables across scales, as well as a *longitudinal view* of patterns in poverty, vulnerability and wealth. The practical contribution of the approach for resilience programming in the region is two-fold. First, by directing attention to systems it overcomes an inherent bias of many research efforts that emphasise administrative units, thereby missing critical flows and connections across borders and groups, which may nonetheless be revealing of the 'wiring' of livelihoods and productive activity. Second, it emphasises the need for a longer-view, thus overcoming the tendency of more circumspective perspectives that might overplay or wrongly interpret shorter-term trends.

Advances in resilience programming in dryland eastern Africa require grounded insights on trends over time in particular places. While there is a reasonable understanding of broad changes in the region, and emergent forms of pastoralism in this setting, practical action will require more extensive data over time as well as more precise insights on what is happening for different livelihood categories (moving up, moving out, hanging in, and dropping out) as well as for groups within these who may seemingly follow a similar pathway but require different sorts of resilience strengthening.

The evidence review conducted as part of this work shows that, in keeping with Figure 1, markets and the level of commercialisation are relevant livelihood dimensions common across all systems. Empirically, the market access dimension can be measured using similar, if not identical indicators to those in table 4, above. However, pastoralists in a number of areas are increasingly pursuing land-based livelihoods (farming, harvesting woodfuel, charcoal burning), a combination of livestock and farming-based livelihoods, and still others are moving into processing, trade and activities that may or may not be related to pastoralism yet they remain embedded in the pastoralist system (such as hides and skins, micro-dairying, collecting and selling forage for a fee). This broader conceptualization necessarily means that the modelling will become messier as we can no longer think in only two dimensions of commercialization/markets and livestock, but we need to account for the nature of resources used for livelihoods. Further work should strive to include a range of resources, over and above livestock, into identifying patterns of change within drylands.

Minimal long-runs of panel data are available on dryland eastern Africa. These datasets often lack consistency and compatibility of indicators. National datasets are unable to adequately represent dynamics at lower levels and at the pastoral system level due to methodology, access and design issues. Pastoralist systems cut across national and administrative boundaries, yet most data is bounded by national or regional boundaries. Very few datasets are publicly available and there is limited collection of data on indicators that relate explicitly to pastoral and agro-pastoral livelihoods.

This article suggests possible data sources that can be utilised in the short run to investigate differentiated trajectories of change. Over and above this there is a need to fill data gaps by collecting indicators on population, livestock, land use, livelihoods (income sources) and mixed migration, as well as other major demographic indicators: pastoral livelihoods, income diversification, education and access to social services, and conflict. This can be done in large part by improving methodologies and coverage of national surveys.

We have proposed what we believe to be an innovative, layered approach to mapping and measuring change and dynamics both of a system itself as well as the livelihoods that comprise the system. Using a creative bricolage of methods and data appropriate to the different layers of the system, it is possible to build up a picture of the trajectories of change of the system, as well as the influences on and within the system and livelihoods. Ideally, the next logical step in this work will bring these different types of data and analysis together to provide a grounded understanding of trajectories of poverty and vulnerability in different regions.

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ⁱⁱⁱ As background research for this article, case studies were prepared on each of these systems (see Lind et al., 2016b). Full details are available here: [include URL for website where Case Study Report is posted – to be online later in 2016].

^{iv} 'Where Somalia is king of the world.' *Mail and Guardian Africa*. May 3, 2015. Available at:

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^v Behnke and Kerven (2013) find that the estimated annual net, per hectare returns to pastoralism were about 6,000 Ethiopian Birr (EB) at the lower range of potential stocking densities, up to EB 12,000 at high animal densities. This compared to annual losses of more than EB 2,000 per hectare suffered by the state cotton farm in the decade of the 1980s.

^{vi} 'Life in Dadaab: three generations of refugees isolated from Kenyan society.' *Guardian*. January 27th, 2016.

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^{vii} Examples include the establishment and spread of camel micro-dairying operations by Gode town-dwellers over the past 20 years, who supply both local markets as well as the Somali market in Addis (Hussein, 2013).

^{viii} As background research for this article, timelines were prepared on each of the five systems (see Lind et al., 2016b). Full details are available here: [include URL for website where Case Study Report is posted – to be online later in 2016]

^{ix} Figures detailing livelihood and economic activities were prepared for each of the five systems examined in this article. For details, see [include URL for website where Case Study Report is posted – to be online later in 2016].

^x This figure draws on the evidence collected for this article. This analysis is produced for each of the five systems covered by the article. See Lind et al. (2016b).

^{xi} Possible datasets are identified in Lind et al. (2016a).

^{xii} See the Technical Note on the Evidence Synthesis and the Data Mapping, as well as the accompanying Excel databases (Lind et al., 2016a).

^{xiii} McPeak and Little 2014, page 54.

^{xiv} McPeak and Little (2014) adapt the 2012 work to apply the World Bank's Economics of Resilience framework.

^{xv} PARIMA Project Data. Retrieved February 25, 2016, from:

<http://barrett.dyson.cornell.edu/Parima/projectdata.htm>.

^{xvi} Northern Uganda Baseline Study (2004), Uganda Bureau of Statistics. Retrieved February 25, 2016, from:

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