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Enhancing Resilience in the Horn of Africa

An Exploration into Alternative Investment Options

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ABSTRACT

The most recent (2010-2011) drought in the arid and semiarid lowlands (ASAL) of the Horn of Africa has rendered over 13 million people in need of food, and caused a devastating famine in southern Somalia. The drought has also raised concerns that pastoralist livelihoods in this region are no longer viable or sustainable, thereby justifying strategies that aim to sedentarize and diversify these livelihoods. Countering this view are advocates of wholesale protection of pastoralist livelihoods. Yet despite these very contrasting views on economic development in the region, very little research directly addresses this *big picture* question of where public resources should be invested. In this paper we argue that both economic theory and the existing evidence base warrant a more balanced development strategy involving movement out of pastoralism (*intersectoral* transformation), modernization of pastoralism (*intrasectoral* transformation), and cross-cutting transformations of the demographic, social, and political structure of ASAL populations. We then explore the empirical basis for balancing investments across these kinds of transformations. While the available evidence base is weak in some respects, we find that most nonpastoralist livelihoods in ASAL yield lower incomes than pastoralism, with the exception of urban livelihoods and irrigated farming. However, both irrigation and urban migration have a limited capacity to absorb growing populations. Additional irrigation investments in pastoralist regions, for example, appear to be capable of profitably absorbing only about three percent of the estimated pastoralist population in 2020. Migration is more promising, but only provided that it comes on the back of much larger investments in education and meaningful urban job opportunities.

Being the dominant livelihood for the foreseeable future, and potentially quite a profitable one given growing demand for livestock products, pastoralism therefore needs to be an important component of local and regional development strategies. The goal of livestock investments should be to transform the pastoralist sector into a more profitable, more integrated, and more resilient economic system. The basis for achieving this transformation comprises a number of overlapping and largely reinforcing investments: (1) commercializing pastoralism with the goal of improving the competitiveness, value addition, poverty impact and outreach of livestock markets; (2) improving natural resource management; (3) economic diversification, but in a manner that is compatible with existing pastoralist livelihoods; (4) improved social infrastructure (pertaining to health, nutrition, and education); (5) improved physical infrastructure (principally roads, mobile telephony, and irrigation where profitable); (6) more effective disaster risk management strategies; and (7) a range of governance efforts, including efforts at better protection of pastoralist property rights, strengthening of conflict resolution mechanisms, and further efforts to promote bottom-up policymaking.

While these arguments are grounded in economic theory and in the available evidence, our concluding section notes that this evidence is rather weak on many fronts, including basic statistics on human and livestock population, as well as more complex issues of carrying capacity. Building a better strategy for ASAL regions therefore requires a coordinated but interdisciplinary research program that can systematically pick up the various pieces of the pastoralist puzzle. This research should not only answer the crucially important questions of how to balance investments across livestock and nonlivestock sectors, but also involve rigorous evaluation of on-the-ground demonstrations trialing innovative methods of service delivery that overcome the severe constraints of isolation, mobility, and extreme vulnerability to climatic shocks.

Keywords: Horn of Africa, pastoralism, resilience, development strategies

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1. INTRODUCTION

The recent drought in the Horn of Africa is intensifying perceptions that the region's pastoralist-dominated livelihood system is unsustainable. Certainly in some respects this pessimism is justified. Droughts in the arid and semiarid lowlands (ASAL) of the region seem to regularly decimate herd sizes, and the impacts of these droughts appear to be increasing over time. Such frequent shocks make it difficult (in some cases impossible) to restock herds, thus permanently pushing many pastoralists into nonpastoralist livelihoods that are often less resilient than pastoralism. In addition to cyclical problems, secular trends in human and livestock population growth are widely thought to be creating unsustainable pressure on land and water resources, and increasing the vulnerability of pastoralist populations to drought. Human populations are growing rapidly just as grazing lands for pastoralists are shrinking on the back of cropland expansion, shrub or pest encroachment, and conflict. Climate change is also a major threat to such an arid region, and some studies predict an impact already and a greater impact in the future (Williams and Funk 2011). Related to these trends are political economy processes that have directly and indirectly hindered pastoralist development. Scarcities of land and water are both driving local conflicts and contributing to the larger scale civil war in Somalia. But more generally there are perceptions of an entrenched political disconnect between pastoralist populations and the predominantly nonpastoralist central governments of the region.

Yet despite some truth in all of these arguments, pastoralist pessimism needs to be tempered by a number of underrecognized facts. First, pastoralism is undoubtedly a sector of comparative advantage in the semiarid lowland regions of the Horn. These regions are characterized by relative land abundance but also by rainfall patterns that vary markedly across both time and space. Mobile livestock herds make efficient and risk-minimizing use of such an environment. Numerous studies have shown that mobility and trade are key to both wealth accumulation and drought management for pastoralists (ILRI 2010; Devereux 2006; Little et al. 2010a, 2010b, 2010c), and that mobile pastoralists appear to be significantly better off than ex-pastoralist sedentary farmers in the same regions (especially farmers without irrigation).

Second, the domestic and international environment for livestock trade is actually quite favorable. Along with other commodity prices, international livestock prices have increased markedly in recent years. In Ethiopia, expanding crop area in the highlands, rising incomes, and the prospect of rapid urban population growth all imply that the demand for meat will continue to grow rapidly in the years to come. Indeed, prior to the current drought, the terms of trade for livestock vis-à-vis grains were actually very favorable toward specialized livestock producers (see below). Livestock exports from Ethiopia have also been booming for several years (albeit from a low level), and the region as a whole is ideally placed to cater to strong demand from the Middle East. Indeed, prior to the civil war in Somalia, that country was the largest exporter of live goats in the world.

Finally, while pastoralism is facing sustainability problems associated with population growth, shrinking grazing land, and more frequent weather shocks, this is not in itself a justification for neglect of pastoralism. If the ultimate goal of longer term investments in the region is to achieve a successful economic transformation, then this process will invariably require investments in pastoralism as well as a number of other sectors. This is because historical successes in development have—with very few exceptions¹—entailed both an *intersectoral* transformation from traditional agriculture to nonfarm sectors, as well as an *intrasectoral* transformation of traditional agriculture itself, into a more productive and commercialized sector (Timmer 2007). Without such an intrasectoral transformation accompanying the diversification of livelihoods, poverty reduction will typically be very sluggish, chiefly because nonfarm sectors can rarely grow quickly enough to absorb the exiting agricultural labor. This is particularly true in pastoralist areas where there are no obvious large-scale sources of nonfarm employment.

While these arguments are valid in general, they still tell us little about what an optimal investment portfolio in ASAL areas should look like. How much should we invest in pastoralism relative

¹ The only real exceptions to this statement are countries either with no agricultural sector to speak of (such as Singapore and Hong Kong) or with hugely abundant mineral deposits (such as Botswana).

to nonfarm sectors, or relative to more generic investments in infrastructure, education, health, family planning, and so on? And what kinds of specific outcomes are we looking for? The usual objective of higher incomes may not be sufficient in a region where environmental sustainability and economic resilience are also critical objectives of quite immediate importance. Thus the first question posed in this paper is “*Where should we invest?*”

Yet a second and deeply interrelated question is “*How should we invest?*” This question is critical because even if one can identify investments where high benefits would accrue, various geographical and sociopolitical characteristics of ASAL regions may render the costs of such investments exorbitantly high. Of particular concern are very low population densities and high (but declining) rates of mobility. This makes the targeting of public services very costly principally because of high transport costs, but it also makes reducing transport costs less cost-effective because any given road in a low-density area will be used much less frequently. Thus the question of how to make the most cost-effective and strategic use of space is a critical but often under recognized facet of investment in pastoralist areas.

A second constraint pertains to information asymmetries and sociopolitical tensions. Pastoralists know much more about pastoralism than any outsider ever could. This means that developing the pastoralist economy needs the active participation of pastoralists themselves in addition to the technical expertise and investments of outsiders. Community-led development is therefore critical for managing and sharing scarce resources, for designing policies that are consistent with pastoralist livelihoods and their constraints, and for ensuring that pastoralists themselves feel a greater sense of ownership of and inclusion in the development process. Expanding education services in pastoralist areas will also be crucial for improving these relationships, because individuals with pastoralist origins will provide an indispensable link between the local and the central, and between the modern and the traditional. These spatial and sociopolitical constraints suggest that technological and institutional innovations will be absolutely essential for rendering pastoralist development projects more effective.

A third and final question posed in this paper pertains to how we can improve the evidence base upon which investments are made. This issue is critical in pastoralist areas because ASAL regions are grossly deficient in most statistics of relevance, including human and animal population levels and dynamics, available grazing land and water resources, and adaptation to shocks. On the research side there is quite a substantial literature on pastoralism, yet that literature is strong in some regions and weaker in others, and in some regards it can quickly become out of date (for example, in relation to the impact of cellular telephones). Moreover, the aforementioned need for innovative interventions in pastoralist areas also means that we need much greater demonstration and project or program evaluation of these interventions.

As for the remainder of the paper, its structure is as follows. Section 2 provides an overview of both secular and cyclical problems in the Horn of Africa, with particular focus on the frequency and impact of droughts and floods, trends in herd size, and population growth and grazing land constraints. Section 3 outlines a framework for thinking about the “where to invest” and “how to invest” questions posed above, based on concepts of economic transformation augmented with those of resilience and sustainability. Section 4 reviews the literature on existing interventions in ASAL regions, which—in general—is a literature highly critical of previous interventions. Section 5 explores the key issue of how to invest, with an emphasis on the kinds of institutional and technical innovations discussed above. Section 6 concludes with an emphasis on knowledge gaps and the need to improve the evidence base.

2. UNDERSTANDING VULNERABLE LIVELIHOODS IN THE HORN OF AFRICA

The arid and semiarid lowlands (ASAL) region of eastern Africa covers most of Djibouti, large areas of southern and eastern Ethiopia, the vast majority of Kenya, and virtually all of Somalia. Figure 2.1 shows these pastoralist areas, along with major trade routes of livestock and maize (discussed further below). Exact numbers on the size of populations in these regions are rather hard to come by, but the size of the pastoral population in the Horn of Africa has been estimated at between 12 million and 22 million people, depending on how pastoralism is defined and on data sources used (Sandford 2010). The population of ASAL regions is also growing rapidly based on very high fertility rates, which are apparently still lower than desired fertility rates.

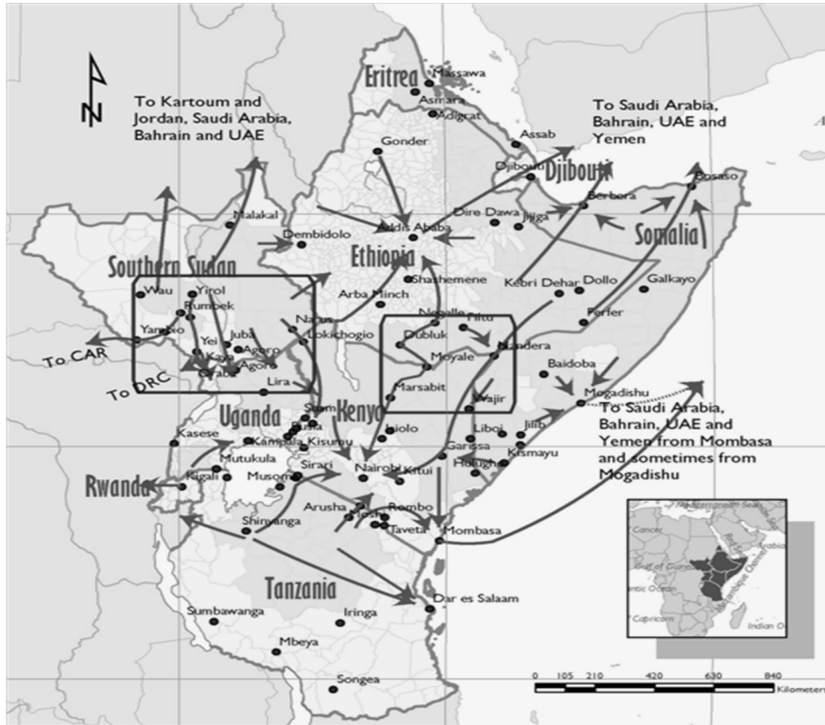
Despite commonly being labeled *pastoralist areas*, the ASAL regions of eastern Africa are home to livelihoods more complex and varied than is often assumed. While the pastoralist label still has some foundation—pastoralism is still the dominant source of income and employment—there are also sizable numbers of workers in crop-based farming as well as in nonfarm occupations in rural and urban areas. For example, a study of the Somali region of Ethiopia by Devereux (2006) found that almost 70 percent of households engage in livestock rearing, but large shares also engage in cereal crop production (43.4 percent), firewood production (17 percent), and charcoal production (14.7 percent), while smaller but not insubstantial numbers of households engage in various cottage industries (for example, mat making at 6.3 percent), petty trade or services, or higher value crop production. Salaried employment is present in just 3.2 percent of households. Similar levels of diversity are found in the Afar and Borena regions of Ethiopia, and in Kenya there is generally more diversification, although this also varies across space (McPeak, Little, and Doss 2011; Davies and Bennett 2007; DRMFS and USAID 2011). Of course, this diversification is in some sense marginal: The capacity to scale up petty cottage industries and firewood or charcoal production is limited, and in the case of firewood and charcoal production a scaling up would be undesirable for environmental reasons. Arguably only gum Arabic has reasonable opportunities for scaling up, given strong international demand.

Livelihoods are also diversified within households (with women often engaged in petty trade, services, and charcoal collection) and within pastoralism itself. For example, the purely nomadic form of pastoralism, based on seasonal migration, has long been giving way to transhumance pastoralism, wherein part of the household and livestock herd is migratory (typically male adult household members and male and more robust animals), while the remainder of the household lives in a permanent or semi permanent setting (typically women and children with a herd dominated by female and less vigorous animals) (McPeak, Little, and Doss 2011; Devereux 2006). Many relatively sedentary households are more aptly described as agro pastoralist.

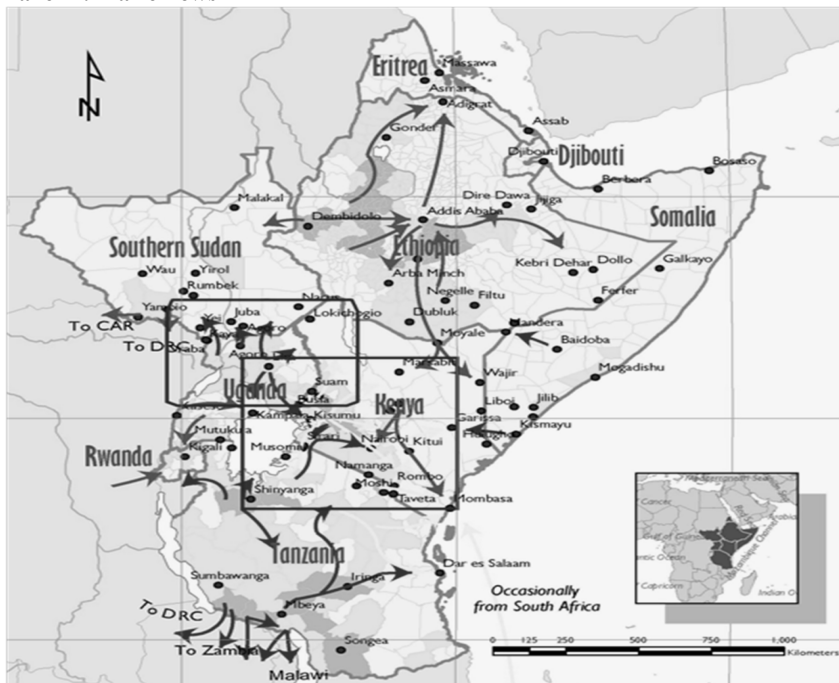
Hence the economies of ASAL areas are clearly still dominated by pastoralism. This is unsurprising from an economic viewpoint. For while, the *attachment* of ASAL peoples to livestock is often considered cultural. However, the economic basis for pursuing pastoralism is comparatively advantageous. Mobile livestock rearing makes efficient use of the region's abundant land and volatile climate by using predominantly seasonal migration to move herds to where water and feed resources are more abundant. This comparative advantage also stems from the region's close proximity to major sources of demand in the highland areas of Ethiopia and Kenya and, more recently, in the Middle East (Figure 2.1 shows pastoralist export routes for livestock). In exchange for exporting livestock to these areas, pastoralists import cereals, such as maize from the East African highlands (Figure 2.1) and pasta, wheat, and other cereals via Somali ports. For these reasons the terms of trade between livestock and maize (or, more broadly, grain) are often taken as an indicator of pastoralist welfare.

Figure 2.1—Livestock and maize trade flows in eastern Africa

Panel A. Livestock flows



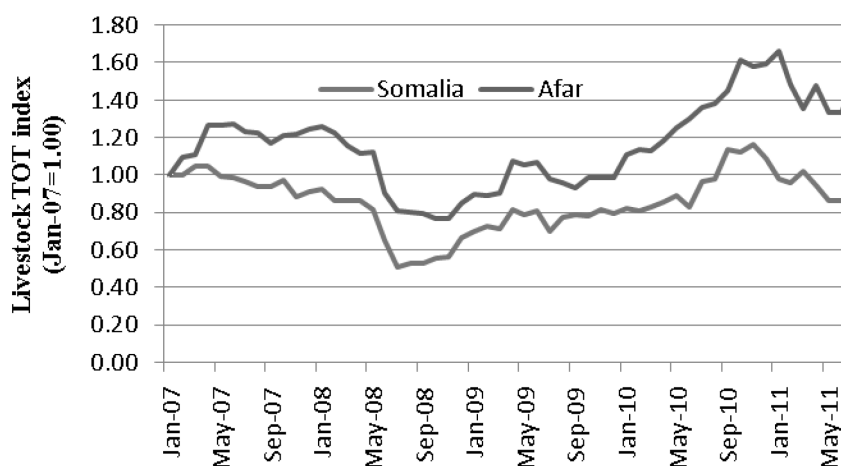
Panel B. Maize flows



Source: FEWSNET (2011), www.fews.net.

Although this terms-of-trade indicator is not comprehensive enough from a welfare standpoint, it is nevertheless indicative of how livestock's comparative advantage can vary over time based on national and international price movements. In Ethiopia, for example, this comparative advantage has fluctuated substantially in recent years based on cereal price inflation in 2008 and strong growth in livestock prices in 2009 and 2010, before a sharp collapse in the pastoralist terms of trade in 2011 due to the drought as well as grain price inflation across Ethiopia (Figure 2.2).

Figure 2.2—A terms-of-trade index for livestock relative to grain in two pastoralist regions of Ethiopia, January 2007–July 2011



Source: Authors' calculations from Ethiopian Central Statistical Agency data.

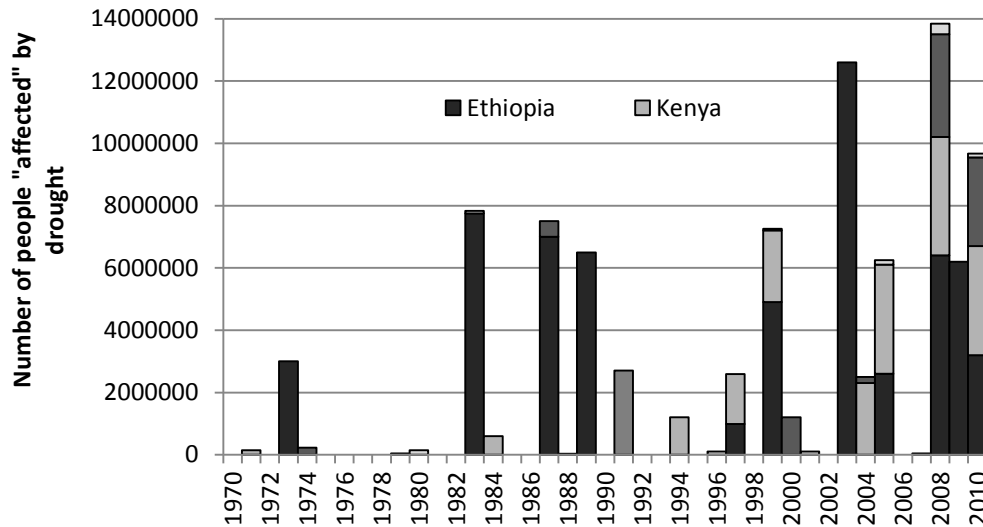
Notes: TOT = terms-of-trade. The TOT index for pastoralists is the ratio of the livestock price index to the grain price index.

Volatile prices (terms of trade) are one aspect of the vulnerability of pastoralist livelihoods. In addition to influencing prices, droughts and floods impact livestock mortality (particularly droughts). However, the fact that both external conditions (prices) and domestic conditions (price and livestock mortality rates) influence pastoralists' welfare means that one needs to look at droughts in both pastoralist and nonpastoralist regions of eastern Africa. In Figure 2.3, we use the EM-DAT database on disasters (CRED 2011) to look specifically at the timings of droughts in both pastoralist and nonpastoralist areas, as well as very rough estimates of the number of people affected.² The data show several disturbing facts. First, there is some indication that droughts are increasing in frequency in recent decades (bearing in mind poorer recording of droughts in earlier periods). Certainly, the decade from 2000 to 2010 has been a very bad period for pastoralist areas, with four major droughts in all three countries. Second, the scale of impact is immense. In each drought—bar the 2004 drought in Somalia—more than a million people were affected in each country, and typically several million people. Third, major droughts in nonpastoralist areas of these countries, particularly Ethiopia, are also common and likely to impact pastoralist populations quite adversely if cereal prices rise. In 2003, for example, there was a major drought in the largely highland parts of Ethiopia that was estimated to have affected more than 12 million people. In landlocked countries like Ethiopia these kinds of shocks to nonpastoralist, cereal-producing areas could

² A number of caveats: First, *number affected* is a vague term masking potentially enormous variations in the severity of impacts. Second, there may have been poorer recording of droughts in earlier periods, which would bias inferences regarding trends in frequency. Third, we are looking only at droughts. In fact, floods are also a major problem in many pastoralist areas, although these tend to be more localized and less harmful to food security, with the EM-DAT data suggesting that only a few floods have had large-scale effects (CRED 2011). Flooding appears to be a regular occurrence in Somalia, especially, and the EM-DAT data suggest that several floods in Somalia have been large in scale (CRED 2011). Floods in 1997, 2000, and 2006 affected hundreds of thousands of people in each occurrence.

hurt pastoralists quite badly via, among other things, reduced demand for livestock and considerably higher grain prices.

Figure 2.3—Estimates of the number of ASAL people adversely affected by droughts, 1970–2010



Source: CRED 2011.

Notes: This is only an estimate of the total number of people affected; the numbers given are only approximate. In addition to the problem of identifying affected people, there is the issue of degree of impact, which is not recorded, as well as possible omissions in earlier periods due to less effective measurement, poor governance, and so on. Also, some of the estimates are inaccurate because of unclear distinctions between lowland and highland populations, particularly in Ethiopia.

A limitation of the EM-DAT data (CRED 2011) is that they say little about the impact on pastoralism per se. Droughts are the number one killer of livestock in pastoralist regions, by far. Table 2.1, for example, shows reasons for decreasing livestock ownership in the Somali region of Ethiopia over the period 1995–2005. Mortality due to drought is cited in 100 percent of households for camels, cattle, and shoats (sheep or goats). In other words, not a single pastoralist household in that sample escaped being adversely affected by drought. According to a 2011 Ethiopian Central Statistical Agency (CSA) survey in the Afar region, 71 percent of households reported drought as the major shock, while more than 68 percent identified lack of drinking water and grazing land as having a moderate to severe effect on their livestock. The Pastoral Risk Management (PARIMA) project in southern Kenya and northern Ethiopia found a remarkably similar result, as do studies of the Ethiopian livestock sector as a whole (Desta and Coppock 2004). To make matters worse, higher livestock mortality rates appear to be driving a decline in herd sizes. While this conclusion is qualified by the lack of truly objective, up-to-date, and larger scale data, Lybbert et al. (2004) found that self-reported data from southern Ethiopia and northern Kenya suggested sharply falling herd sizes, declining from the early 1980s to the mid-1990s (see Figure 2.4). Respondents in Devereux’s (2006) survey of the Somali region of Ethiopia reported a similar result, as did Afar pastoralists interviewed in the survey by Davies and Bennett (2007).³ Lybbert et al. also

³ Of course, there may be obvious biases in self-reported data. One World Bank colleague remarked that central governments may distrust self-reported livestock mortality data because pastoralists overstate livestock mortality in order to get more emergency support. Davies and Bennett (2007) also discussed the problems with asking pastoralists direct questions about herd size and trends. Even so, declining herd sizes would be consistent with rapid population growth and fixed or shrinking grazing lands, as well as more frequent drought. Thus while there is a lack of knowledge on the true extent of the decline, there appears to be broad agreement that herd sizes have indeed declined significantly.

demonstrated that when herds fall below a critical threshold they typically continue to decline (see Figure 2.5):

A threshold point appears to exist at an unstable equilibrium of 10–15 animals, necessary to sustain mobile, transhumant herding, given average household size of 6–6.5 people during this period. Above that threshold, households can feasibly undertake the opportunistic, spatially flexible herding associated with extensive pastoralism. When a household's stock of animals falls below the threshold level, it effectively switches to a different, sedentarised production system. Sedentarised herding is vulnerable to the region's considerable spatio-temporal variability in rainfall, however, so it becomes exceedingly difficult to maintain a herd of any size if one cannot migrate. It is important to note, moreover, that sedentarisation with a small herd implies dire poverty in this context, as there are few nonpastoral options available to stockless pastoralists, the vast majority of whom are illiterate. (2004, 469)

If the PARIMA findings hold true for the period after 2000 (which seems likely given the more frequent and more severe droughts) and if they hold true in other pastoralist areas of the Horn (a premise supported only by anecdotal data), then they suggest that increasing numbers of ASAL households are being pushed out of pastoralism rather than experiencing any positive diversification based on *pull* factors. Moreover, sedentarized pastoralists are still just as vulnerable to drought as pastoralists (in many contexts, perhaps more so) and generally appear to have lower incomes. Indeed, while outsiders typically consider pastoralists extremely vulnerable, household expenditure surveys actually find that their livestock assets render them wealthier than most other populations in their countries, leading to what has often been called the wealth–vulnerability paradox (Devereux 2006).

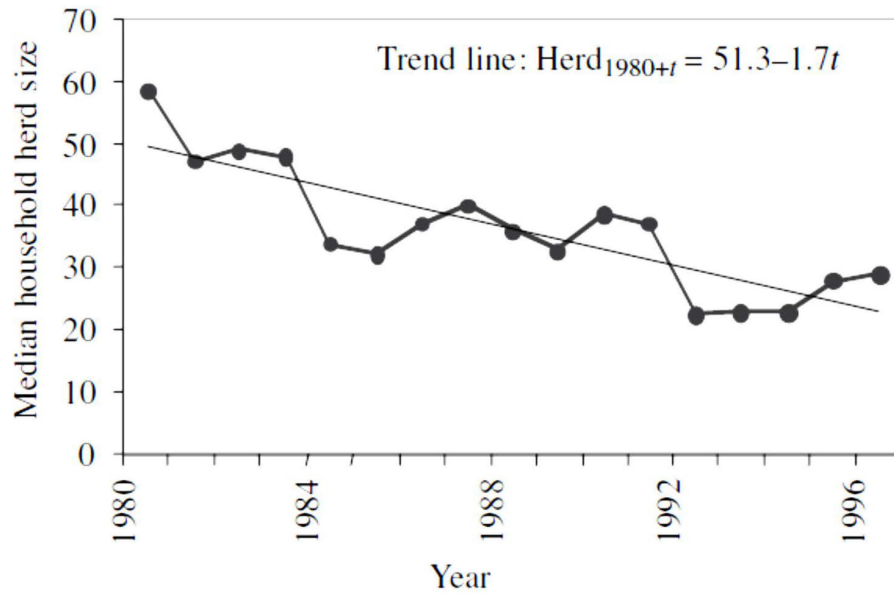
Table 2.1—Reasons for decreasing livestock ownership in the Somali region of Ethiopia, 1995–2005

Reason	Camels	Cattle	Shoats	Donkeys
Died in drought	363 (100%)	477 (100%)	570 (98%)	67 (17%)
Disease	247 (77%)	265 (57%)	346 (59%)	23 (6%)
Contribution (<i>zakaat</i>)	143 (45%)	165 (36%)	262 (45%)	1 (0%)
Sold for food	124 (39%)	213 (46%)	257 (44%)	12 (3%)
Eaten by wild animals	117 (37%)	170 (37%)	287 (49%)	13 (3%)
Consumed at home	103 (32%)	175 (38%)	391 (67%)	5 (1%)
Dowry payment	96 (30%)	116 (25%)	79 (14%)	0 (0%)
Offering (<i>Allah bari</i>)	73 (23%)	114 (25%)	329 (56%)	1 (0%)
Charity (<i>qaadhaan</i>)	68 (21%)	97 (21%)	211 (36%)	4 (1%)
Compensation payment	62 (19%)	44 (10%)	25 (4%)	0 (0%)
Sold (not for food)	53 (17%)	95 (21%)	117 (20%)	3 (1%)
Lent or rented out	30 (9%)	29 (6%)	51 (9%)	2 (1%)
Lost	24 (8%)	31 (7%)	50 (9%)	4 (1%)
Stolen	16 (5%)	14 (3%)	20 (3%)	2 (1%)
Conflict	8 (3%)	1 (0%)	1 (0%)	0 (0%)
Poisoned	6 (2%)	20 (4%)	26 (4%)	2 (1%)
Raiding	5 (2%)	3 (1%)	2 (0%)	0 (0%)
Total	320 (100%)	462 (100%)	583 (100%)	396 (100%)

Source: Devereux (2006).

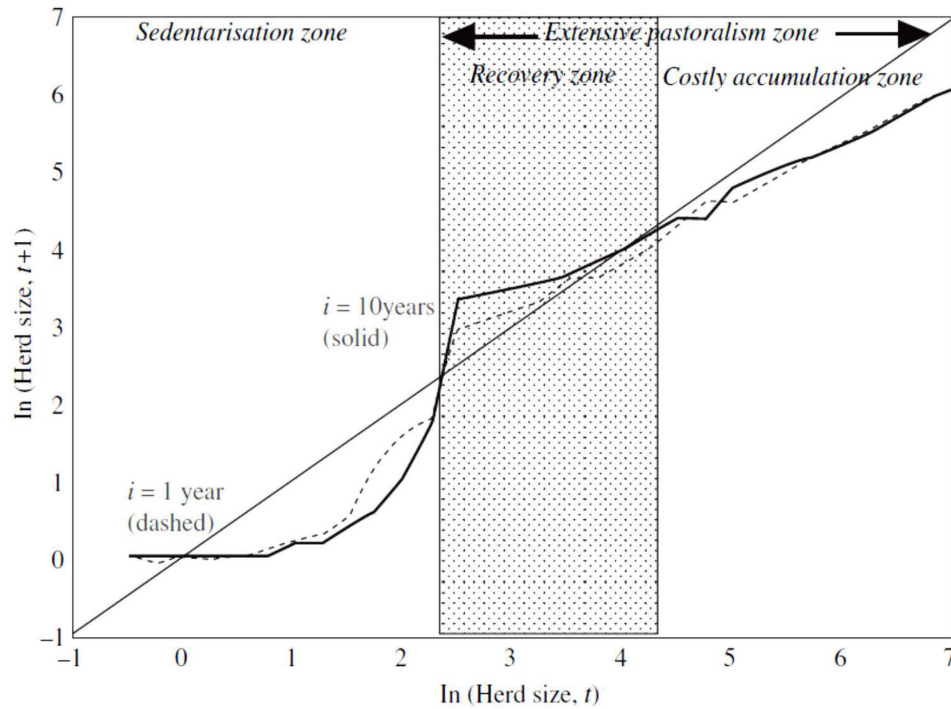
Notes: The data refers only to those animals that owned the animal in question.

Figure 2.4—Cattle cycle and median herd size



Source: Lybbert et al. (2004).

Figure 2.5—Herd size threshold effects that push households out of pastoralism



Nadaraya-Watson estimates using Epanechnikov kernel with bandwidth ($h = 1.5$)

Source: Lybbert et al. (2004).

In addition to declining herd sizes, the PARIMA study also reported many other changes in pastoralist livelihoods, many of them quite negative (Desta and Coppock 2004). For example, respondents overwhelmingly stated that access to grazing land was shrinking, as was milk consumption and overall standard of living (Table 2.2). However, commercialization and monetization were generally increasing, and most respondents reported increasing cattle and camel production (perhaps at odds with reduced access to grazing land, though that depends on at what point in the livestock cycle—accumulation or otherwise—the data were collected).

Table 2.2—Self-reported changes in livelihood characteristics in southern Ethiopia

Feature	Decreasing	Increasing	No change
Access to grazing land	91	7	2
Milk for people	97	1	2
Milk for calves	97	1	2
Standard of living	55	11	32
Grain in markets	22	76	0
Pastoral grain consumption	1	99	0
Pastoral dairy sales	29	71	0
Human population	0	98	0
Need for cash income	0	99	1
Cattle production	24	74	2
Sheep production	74	24	2
Goat production	59	38	3
Camel production	14	84	2

Source: Desta and Coppock (2004).

Notes: Seventy-five percent of respondents also felt that a gradual privatization of key lands due to creation of fodder reserves and cultivation, and increasing restrictions on access to the deep wells for poorer households were reducing mobility of livestock herds. Some rows may not add to 100%, due to some respondents' having "no opinion."

One remaining livelihood characteristic of some importance to the discussions below is why pastoralists seemingly choose to incur livestock deaths rather than selling livestock commercially as droughts hit. Drought, after all, is a slow-onset disaster. To give a typical example, the PARIMA study of the Borena zone of southern Ethiopia found that net sales over the period 1982–1997 averaged just 2 percent of initial herd size (Desta and Coppock 2004). The off take rate would vary across communities, but this statistic points to a lack of commercialization.

A key question, however, is whether commercialization is a constraint in itself, or simply a symptom of other problems. The desire to hoard livestock rather than destock—seemingly in the face of very high and well-known mortality risks—is superficially puzzling but is further explained by the complex dynamics of herd sizes. Droughts are a cyclical occurrence in ASAL regions, meaning that pastoralists know full well that the next drought will kill at least some of their herd. Hence, in the absence of commercial opportunities it makes sense to maximize pre drought herd size, because that in turn tends to maximize post drought herd size (Lybbert et al. 2004). But this explanation holds only if commercial destocking and restocking is not an option. Why might this not be an attractive option? First, physical access to markets is poor. Moreover, in times of drought, long-distance treks to markets may be risky, especially if there is a further risk that sales may not be forthcoming (Davies and Bennett 2007). Second, destocking is an option only if restocking is easy. However, restocking generally depends not on commercial purchases but on purchases or in-kind gifts within tribal or clan groups. It may be that this local *market* for restocking is too small to facilitate quick restocking, especially if cultural norms cause excessive destocking to be perceived as bad herd management. Third, the missing market may not be the one for restocking per se but the one for credit and finance.

Finally, while it is impossible to do justice to the myriad of cultural norms or institutions that govern pastoral life, many such institutions do exist for regulating the management of herds, grazing lands, and water. Not all such norms are peaceful—cattle raiding and violent resistance to it are long-established traditions in many pastoralist cultures—but institutions of self-governance are an important part of pastoralist livelihoods, given pastoralists' isolation from central governments and significant cultural and ethnic differences from highland populations.

3. CONCEPTUAL FRAMEWORK: ECONOMIC TRANSFORMATION AS A GUIDING PRINCIPLE

Much of the evidence reported in the previous section gives a rather grim picture for the future of pastoralism. Declining herd sizes, shrinking grazing land and water access, more frequent droughts, and increasing vulnerability all point to very grim prospects for pastoralist livelihoods. This would appear to justify the views of some policymakers that pastoralism is not a viable livelihood and that some mix of rural and urban sedentarization is the right way to go. In this section we explore whether these claims are supported by economic theory and available evidence.

A useful framework for thinking about these issues is one of economic transformation. Transformation is the process by which a traditional and largely subsistence agrarian economy becomes a more modern and diversified economy. There is a large literature on economic transformation going back to the founding fathers of economics, such as Adam Smith, Malthus, and Ricardo, but of greater relevance here is the more contemporary analysis of transformation episodes, and of economic success stories in particular. In general, economists have identified four processes that interact with each other to produce a broader economic transformation (Timmer 2007):

1. Intersectoral transformations of output and employment. Agriculture's share of output and employment declines over time, although the former often declines more quickly than the latter.
2. Intrasectoral transformation of agriculture. Agriculture is transformed from a traditional, subsistence, and low-productivity sector to a modern, commercialized, and higher productivity sector.
3. A rural-to-urban transformation. The bulk of the population becomes urban, initially largely through migration from rural to urban areas.
4. Transformation of population structure. Specifically, a demographic transition from high birth and death rates to low ones occurs. Lower fertility rates are partly caused by other aspects of transformation (higher incomes and urbanization) but also by increased female education, improved health (such as lower child mortality rates), and family planning programs.

These four processes invariably seem to accompany successful economic development, with many of the analyzed success stories either in contemporary Asia or in Western countries in the 19th and early 20th centuries. In general, there are scarcely any relevant exceptions to these processes, although the speed and structure of transformation obviously varies substantially across countries, and there are still debates about the extent to which agricultural transformation pushes intersectoral transformation, or vice versa. What is quite clear also is that the processes do interlink in some important ways. Of particular relevance to the issue at hand is what happens when governments push intersectoral transformation at the expense of agriculture (intrasectoral transformation). There is a large literature showing that attempts to prematurely diversify economies have largely failed, and that neglecting agriculture is disastrous for poverty reduction. This is partly because in the absence of economic growth in the largest sector (agriculture) it is almost impossible to generate sufficient nonagricultural growth capable of absorbing the growth of more workers (Headey, Hazell, and Bezemer 2010).

The basic calculus of this transformation process applies across countries—which explains why these transformations are so prevalent—but there will be many context-specific factors to consider when analyzing the implications of these processes for any given country or region, including pastoralist or ASAL regions.

First, all countries possess different endowments, and this in turn influences what a country's comparative advantage is. The high-population-density countries of East Asia, for example, obviously have a comparative advantage in labor-intensive manufacturing. Other countries have comparative advantages in mining, tourism, or various types of agriculture. Given the relative abundance of land but volatile water resources of the ASAL regions of the Horn of Africa, the historical comparative advantage

of these areas is, of course, pastoralism. However, an important point to note is that comparative advantages can change over time as economies develop new characteristics or deliberately create them. These changes can result from positive interventions—for example, more education in Asia gives Asian economies a comparative advantage in higher tech manufacturing and services—as well as negative trends such as climate change or resource degradation. Thus a relevant question is whether pastoralism still has a comparative advantage. A second relevant question is how policies might favorably alter the economy so as to give the region comparative advantages outside pastoralism.

Another context-specific aspect of economic transformation in the Horn of Africa is vulnerability to shocks and stresses. The stresses engendered by population growth were acknowledged early on in the transformation literature, but vulnerability to shocks was largely ignored until recently. Vulnerability can be characterized as the probable extent to which people suffer deterioration of well-being, usually due to some specified shock or shocks. This definition has a number of implications. It makes vulnerability outcome based, with well-being (nutrition, education, health, rights) as the specific broad outcome of interest. It explicitly relates vulnerability to shocks and the capacity to withstand them. And it identifies vulnerability as an *ex ante* state rather than an *ex post* one. As such, it recognizes that circumstances change and agents are active, not passive. Given the contemporaneous and dynamic interrelationships among dimensions and determinants of well-being, the definition also acknowledges that vulnerability can appear as a cause, a symptom, or a component of an undesirable outcome (or state).

Measuring vulnerability and devising ways of reducing it are not straightforward, however. As a reflection of the difficulties and varied views, the growing recent literature in development discourse displays multiple characterizations, measurement techniques, and policy recommendations.

Nevertheless, there is sufficient microeconomic evidence that shows that causality runs in both directions (see Dercon 2004). For example, when poor people are exposed to severe shocks they make investment decisions that are low in risk but also low in return. Major shocks can also lead to persistent loss of assets, as was shown in the previous section, where we cited evidence that droughts can permanently push households out of pastoralism. It is also well known that short bouts of malnutrition and bad health can have persistent effects on income. The recent literature on both social safety nets and farmer insurance also highlights some of the potential links between vulnerability and transformation processes. Hence, in environments that are extremely prone to shocks, the transformation from a vulnerable to a more resilient economy should be considered as a fifth transformation process that is desirable not only in its own right but also because resilience can contribute to other forms of transformation. This consideration also makes interventions aimed at the short-run management of shocks more relevant to the long-run questions of economic transformation. One can imagine that interventions that reduce the risks faced by pastoralists could encourage higher return investments. On the other hand, some drought management practices could inhibit transformation (for example, livestock restocking programs could inhibit intersectoral movements of labor).

With this broader transformation concept in mind, we then pose the two critical questions at the heart of this paper. These questions and the framework for answering these questions is described in Figure 3.1.

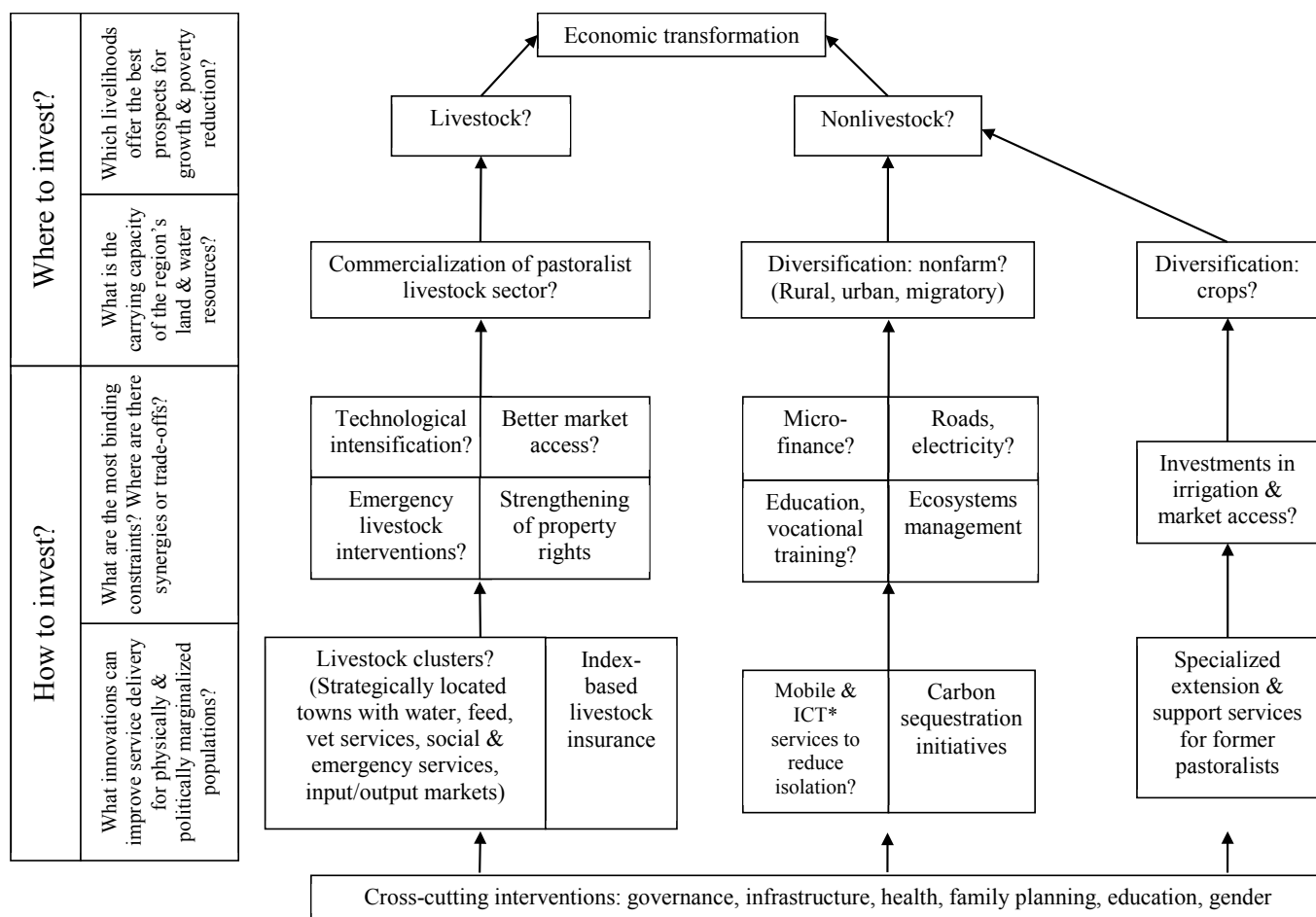
First, Where Should Policymakers Allocate Resources So As to Achieve the Best Possible?

Answers to this question depend on many factors. How many *viable* new livelihoods can be created outside of pastoralism? How many can be sustained within pastoralism given minimum herd sizes discussed above? Answers to these questions in turn depend on variables such as population growth, trends and endowments in grazing land and water access, irrigation potential, and more flexible parameters such as migration and urbanization rates. We think of this question as relating not to either-or answers, but to getting the right mix of policy efforts across sectors. So in some sense the question is to what extent policy efforts should focus on pastoralism rather than other sectors

Second, How Can Investments be Made, So As to Achieve Maximum Efficacy?

In Section 2 we alluded to some very specific problems pertaining to investment and service delivery in pastoralist areas, particularly low population density, mobile households, and low degrees of integration within formal political systems. These characteristics present a major challenge for designing cost-effective interventions in these regions, with the exception of urban service delivery. Hence one challenge to efforts to diversify or commercialize the pastoralist economy is overcoming the twin constraints of geographic and political isolation.

Figure 3.1—Transforming the arid and semiarid lowlands of the Horn of Africa: Where are the knowledge gaps?



Source: Authors' construction.

Note: *ICT refers to Information Communication Technologies.

4. THE SCOPE FOR NONLIVESTOCK DEVELOPMENT STRATEGIES IN ARID AND SEMIARID LOWLANDS

The framework above poses the basic question as to how policymakers should invest in the livestock or nonlivestock sectors, including settled farming and nonfarm activities. While there is substantial pessimism regarding the notion that pastoralism is a viable sector worthy of public investment, the question of where to invest is clearly a relative one. In this section we therefore begin by looking at the potential for nonlivestock investments.

Agropastoralism and Rural Nonfarm Employment

Sedentary farming is the second-largest livelihood in ASAL. In the Somali region of Ethiopia, for example, Devereux (2006) found that almost half of all households were engaged in some type of crop production. Moreover, there is substantial evidence that pastoralists have been rapidly moving out of pure pastoralism and into agropastoralism. However, to date, this diversification has not been a positive transformation process because most such households have been pushed out of pastoralism by a combination of shocks (droughts, disease outbreaks) and stresses (population growth, grazing land encroachment), rather than pulled out by more remunerative nonpastoralist opportunities. This is evident from the fact that agro pastoralists are generally substantially poorer than specialized pastoralists. Outside of irrigation, sedentary farming in these environments is low input–low output, and just as vulnerable to drought (and flooding) as pastoralism.

Another adverse effect of the push out of pastoralism is a growing trade in charcoal and firewood on the back of high demand and few alternative livelihood sources. Although this trade still pays very poorly (Devereux 2006), it has disastrous effects on the local environment and negative spillovers on the major livelihood in the region, pastoralism.

In addition to the move toward sedentary farming, many donor-driven interventions have tried to diversify livelihoods through microfinance and vocational projects. It is very difficult to make any general statements based on these projects because the interventions differ, because very few are implemented at scale, and because there is very little objective evaluation of such projects. It is also impossible to say what potential there is for scaling up, given demand constraints. In light of these limitations we instead focus on the more robust evidence on how pastoralists themselves have diversified their livelihoods. Again, the Devereux (2006) study of Somali and the Pastoral Risk Management (PARIMA) study of southern Ethiopia and northern Kenya (McPeak et al. 2011) are perhaps the most instructive (see also DRMFS and USAID 2011 for a livelihoods atlas of Ethiopia based largely on group interviews).

A key finding from the Devereux (2006) study is that a huge range of nonpastoralist activities are indeed pursued. However, as Table 4.1 demonstrates, very few of these activities return as much income as livestock production and still employ a sizable share of the population. Crop farming and livestock production earn roughly the same (210 and 216 Ethiopian birr [ETB] per month, respectively), while the next largest category (sale of natural products such as firewood and charcoal) earns about half that (ETB 117, which is less than one can earn by begging!). Food and drink processing and services (including sales of milk, butter, ghee, yogurt, tea, and coffee) are female-dominated occupations that earn more than livestock rearing (though obviously involving livestock products). Trading and labor are remunerative activities but make up only about five percent of total employment. Moreover, it also seems likely that many subsectors are heavily dependent on the pastoralist sector because of downstream linkages. Dairy processing is an obvious linkage, but pastoralist incomes are also likely to be substantially driving demand for construction, services, crop produce, small industry, and natural products.

Table 4.1—Average income by livelihood category and by highest and lowest returns

Activity type	ETB/month	% households engaged ^a	Most & least lucrative activities	ETB/month
Trading	615	3.8%	Most lucrative activities	
Rents	502	< 2%	1. Contraband trader	1,607
Employment or labor	447	2.4%	2. Construction worker	1,307
Services	300	10%	3. Carpenter or metalworker	873
Food & drink processing	244	8%	4. <i>Khat</i> trader	868
Livestock production	216	69.9%	5. Meat seller (from own livestock)	853
Crop farming	210	50–55%	Least lucrative activities	
Crafts & small industry	182	6.3%	60. Charcoal seller	100
Begging	123	< 2%	61. Firewood collector	88
Sale of natural products	117	25–30%	62. Basket maker or mat maker	88
			63. Egg seller (from own chickens)	79
			64. Beekeeper (selling honey or wax)	77

Source: Devereux (2006).

Note: ^a The “% of households engaged” is drawn from Table 7.3 in Devereux (2006), but the figures are approximate for some categories because households may be engaged in multiple types of specific activities.

In northern Kenya the situation is often quite different but perhaps offers some vision of what Ethiopian pastoralist economies may evolve into as government services expand, and as migration increases and pastoralist towns develop further. Table 4.2 shows substantial variation across districts. In three districts pastoral income makes up 70–80 percent of total income, and in a fourth it makes up 61 percent. But in two districts it makes up just 30 percent and 43 percent, with wages and salaries being the other main income source. In all districts remittances make up a nontrivial 7–13 percent of income, while trade and business is sizable in two districts and crops in another two. Overall, the research sites seem more diversified than in the Ethiopian pastoralist setting.

Table 4.2—Sources of income by research site, northern Kenya, 2000–2002

Site	Pastoral income	Trade & business	Wages & salaries	Net remittances	Crops
Logologo	30%	13%	43%	13%	0%
N'gambo	43%	7%	30%	8%	13%
Dirib Gumbo	61%	1%	16%	11%	10%
Suguta Marmar	74%	18%	10%	7%	0%
North Horr	73%	3%	13%	11%	0%
Kargi	81%	3%	9%	7%	0%

Source: PARIMA project.

Notes: Pastoral income includes sales of livestock and livestock products.

Tables 4.1 and 4.2 give snapshots of the extent of diversification and how remunerative nonpastoralist occupations are, compared with pastoralism. However, very little research systematically documents the kinds of issues that are standard in the rest of the rural nonfarm economy literature, such as what factors drive participation in nonfarm activities (for example, education, asset ownership, proximity to towns), how nonfarm activity is influenced by agriculture and vice versa, and whether nonfarm employment pulls people out of poverty or is merely the result of poverty. One of the few papers to at least go down the path—albeit with imperfect data—is one by Little et al. (2003), which again uses the PARIMA survey. The main conclusions from that study are summarized in Box 4.1. Essentially, the drivers of rural nonfarm participation in the PARIMA settings look quite similar to those found elsewhere in the literature. Poor people tend to be pushed into nonremunerative nonfarm activities because of a lack

of assets (lack of livestock, lack of cropland, and lack of education), while richer pastoralists diversify income sources in order to increase returns. In general the conclusions from that study are rather lukewarm on diversification. On the one hand such diversification is inevitable when herd sizes are decreasing, but on the other it does not appear to be pulling people out of poverty. Moreover, several projects that have tried to promote diversification via microfinance have been frustrated that pastoralists often used small loans to purchase more livestock (personal communication with World Bank staff in Ethiopia). Yet this in itself is probably indicative of very limited nonpastoralist opportunities in these regions.

Box 4.1—Findings from the PARIMA project on southern Ethiopia and northern Kenya

With declining per capita stock holdings, there is little question that many herders, both male and female, have had to diversify their income-earning activities. What is surprising is how rapid and how much of this has occurred since the 1970s. For areas where agriculture is feasible, there continues to be an expansion of agriculture into former range areas, including dry-season agriculture.... For areas where agriculture is not feasible, diversification mainly has entailed wage labor and trading or business activities. Wage employment usually requires migration out of the study region (for example, to Nairobi), but this varies by locational factors ... different categories of herders—rich/poor and male/female—have responded differently. For the poorest herders unskilled waged labor and petty trade seem to be the most common non-pastoral option, while for the wealthiest it tends to be trading, business, and skilled (higher income) waged labor. The process of diversification affects the richest and poorest herders, leaving “middle” wealth herders relatively out of the pattern.... Sedentarization or settlement often is associated with diversification and provides some increased income-earning opportunities for low-income women. This is especially true in petty trade (milk and vegetable trading), handicrafts, informal alcohol brewing, and local waged employment, where women assume prominent roles.... Wealthier women herders are likely to rely more on income from livestock, and milk and ghee sales, than on other revenue sources. Shop ownership, retail business, and labor migration remain predominantly male activities.... In terms of risk, some data show that cultivation allows herders to better manage risk in zones of adequate climate. They seem to respond better to drought-induced shocks than do other pastoralists, and in these higher rainfall areas pastoralism requires less mobility and thus generally requires less labor than in drier rangelands.... What about the links between diversification and improved risk management in drier pastoral zones? In these areas the issues are more complex and some diversification strategies may directly compete with labor for herding and reduce herder mobility, an occurrence that can have negative social and ecological impacts. The studies from Marsabit district, Kenya, show the potentially negative ecological and social effects of pastoral sedentarization and diversification.... Although there are many alternatives to pastoralism, most tend to generate low incomes and thus may actually increase risk during periods of stress. Especially for poor individuals, diversification is not a risk-averse strategy because they do not necessarily diversify into several different sources, nor do they do so out of choice. They, instead, replace pastoral activities with other activities in order to survive.

Source: Little et al. (2001, 421–423).

Finally, the move to permanent crop production seems to be having mostly negative spillovers on pastoralism and perhaps on livestock production in general. A striking feature of a recent report on land fragmentation in lowland areas of eastern Africa is that there is a pervasive move toward fencing off lands, even without legal permission to do so (Flintan 2011). Because this is a zero-sum game—if a neighbor fences land then it is rational for all other households to start doing so—it seems likely that fragmentation will only accelerate once fencing has begun, which has the effect of gradually reducing the common grazing lands that are so essential for pastoralism to survive. In some contexts this fencing process is profitable, particularly for wealthier ex-pastoralists who are using these lands to fatten animals

for higher value exports. However, from an aggregate perspective it is far more questionable as to whether the consequent sedentarization makes economic sense in low-rainfall environments. Moreover, the process of land fragmentation in most areas is typically very exclusive either of local groups as a whole or of the more vulnerable sections of local groups (for example, female-headed households or poorer pastoralist households). In the worst example of forced sedentarization, some argue that a double tragedy has occurred: Pastoralists are pushed off vital lands while farmers are settled on lands with very low crop potential. Such interventions are clearly ignoring the principle of comparative advantage.

The Special Case of Irrigation

Irrigation projects in pastoralist areas are one favored option among governments in the region, but there are significant controversies over their capacity to absorb smallholder labor and over the quality of their implementation. Devereux (2006) surveyed two irrigated areas of the Somali region of Ethiopia and found that incomes in one of these regions were quite high because of export opportunities to Somalia, but in the other site incomes were only slightly higher than those of pastoralist occupations because of poor access to output markets. Little et al. (2010a) also compared the profitability of large-scale irrigation projects with that of pastoralism in the case of two cotton farms and one sugar farm in Ethiopia. One cotton farm was incurring large losses and doing significant environmental damage; the other cotton farm achieved returns similar to those of pastoralism; the sugar farm made profits that were more substantial than what pastoralism would generate. However, none of these projects created much employment or income for (ex-) pastoralists. A major study on land fragmentation in pastoralist areas by Flintan (2011) documented a number of negative spillovers from irrigation to pastoralism, and several experts have reported anecdotally that some irrigation ventures are often performing less effectively than has been anticipated, with silting and poor maintenance also being problematic.⁴

In the Afar region of northern Ethiopia, irrigation is already a very important part of the regional economy. Irrigation projects already cover almost 70,000 hectares, and new and forthcoming projects will add another 90,000 hectares (Flintan 2011). The government's new agricultural investment plan has also designated another 400,000 hectares of land along the Awash River for commercial investment. Most of the irrigation projects pertain to sugar production, and although they may already be absorbing around 80,000 jobs, there is anecdotal evidence that many of these jobs have been taken up by highlander migrants rather than the local Afar population. There have also been serious negative spillovers for the livestock sector, including reduced access to water sources, the rapid spread of *Prosopis juliflora* (mesquite, an invasive plant species), water pollution from chemicals, deterioration of grazing lands, soil erosion, and increased in-migration of highlanders. While it is not easy to put numbers on either the benefits or costs of irrigation, some of the costs have reached disastrous proportions. *Prosopis*, for example, is arguably the most significant economic problem in the entire region. Introduced in the 1970s as a drought-resistant means of improving soil conservation, the plant is highly invasive (inhibiting the reproduction of indigenous species), extremely difficult to remove, and damaging to animals because of thorns and indigestibility. A recent estimate suggests that *Prosopis* has invaded 1 million hectares, or 30 percent of the region's productive land. And while not solely an outcome of irrigation, *Prosopis* has been shown to spread via irrigation as well as animals themselves, and the plant currently occupies productive land near the river banks. Indeed, in some areas it grows so thickly that it has effectively blocked off access to the river for grazing purposes.

Irrigation projects in other pastoralist regions (northern Kenya, the Somali region of Ethiopia) face similar problems. There are major plans to scale up irrigation in the Somali region. The Ministry of Agriculture estimates that close to 850,000 hectares of land could be irrigated (an estimate that seems optimistic), and there are already significant projects under way (reported by Flintan 2011). In the Somali

⁴ These anecdotal reports are from personal communications with several researchers in the region. One researcher also commented that there is little or no emphasis on opportunities for linking irrigation to livestock through fodder production. In some cases, some amount of fodder production may make economic sense given the region's comparative advantage in livestock production.

region water harvesting through *birkeds* (constructed water reservoirs) and small permanent water sources has been a major development but a mixed blessing given its potentially adverse impact on aggregate land and water resources. In Kenya, *Prosopis* is also a major problem in Turkana and other regions, though other sources of land fragmentation seem even more problematic.

In all cases the problem is not so much irrigation per se but poor implementation, especially in terms of the impacts of irrigation on pastoralists themselves. Irrigation and various types of *land grabs* too often preclude pastoralists from benefiting, but they also cause outright harm by restricting access to, or damaging, land and water resources. Hence, irrigation—though not without potential—is hardly a silver bullet. Moreover, it is an open question as to how much land is profitably irrigable. A recent paper by You et al. (2011) estimates the area and location of profitable irrigable land in Africa using geographic information systems (GIS) analysis and alternative cost assumptions. In Table 4.3 and Figure 4.1 we use those data and methods to recalculate profitably irrigable area in only the lowland areas of eastern Africa (defined as less than 1,500 meters in altitude). Irrigation projects are divided into those of small scale and those of large scale, with large-scale projects defined as dams already under construction or planned or potentially rehabilitated.

The table shows that there is still substantial potential to profitably increase irrigated area in the lowlands of Ethiopia and Kenya, although the estimates vary substantially according to the cost scenarios. Under the low-cost scenarios, for example, 217,000 hectares can be profitably irrigated in Ethiopia, whereas this drops to 156,000–160,000 under the medium- and high-cost scenarios. In Kenya a high-cost scenario would cut the estimate by almost two-thirds. Another point of note is how these estimates contradict some of the estimates produced by governments in the region. For example, one government estimate, reported by Flintan (2011) suggested that more than 800,000 hectares could be irrigated in the Somali region of Ethiopia alone, but that figure is about four times as high as the most optimistic figure in Table 4.3, which applies to all pastoralist areas of Ethiopia, not just the Somali region. This would suggest that government estimates are not factoring in the profitability of potential irrigation projects.

Of course, in many ways our own estimates in Table 4.3 warrant refining, but they suggest that we need to be cautious about putting excessive faith in irrigation for several reasons. First, estimated rates of return for irrigation in lowland areas are very sensitive to cost of implementation (not reported). In the low-cost scenario, rates of return vary from adequate (15 percent in Ethiopia) to very good (70–80 percent in Kenya and Somalia). But these rates of return drop precipitously in the medium- and high-cost scenarios to around 10 percent in the former and 2–7 percent in the latter. Clearly, implementation is critical.

Second, Table 4.3 shows that the number of extra livelihoods that can be created is substantial, but only substantial enough to provide a partial substitute for pastoralism. Under the optimistic scenario that a family of 6 could viably live off 0.5 irrigated hectares, we estimate that further irrigation projects could absorb an extra 6.4–12.6 percent of the rural ASAL population in 2020, depending on cost assumptions. This varies across countries, being higher in Kenya and lower in Ethiopia, for example. However, it is unlikely that irrigation could really sustain this many households. Most rural ASAL households have more like 8 people (though 6 may be a valid estimate for a sedentary ex-pastoralist household in 10 years' time). Moreover, while 0.5 hectares of irrigated land may be enough to keep a household out of poverty in a highland area with good soils and good market access, most ASAL areas have poor access to markets and extension services, and face significant soil fertility problems. So if 1 hectare is a more plausible requirement, then the number of jobs that can be viably created falls to between 3.2 percent and 6.1 percent of the 2020 rural population. Even this estimate may be too high given that many planned irrigation projects are for plantations, such as sugar. If the employment intensity of these projects is much lower than that of smallholder farms—given seasonal labor demands and the possibility of mechanized farming—then the estimates in Table 4.3 may also be on the upper side. So while irrigation can play a role in diversifying livelihoods, its capacity is likely to be limited by both biophysical and institutional factors.

Table 4.3—Profitably irrigable area in the arid and semiarid lowlands of eastern African countries^a

Cost scenario ^b	Country	Profitable increase in irrigated ASAL area (Ha) ^c	Rural ASAL population in 2020 (millions) ^d	Percentage of 6-person rural HHs that could work 1 irrigated hectare ^e	Percentage of 6-person rural HHs that could work 0.5 irrigated hectares ^e
Low-cost	Ethiopia	217,060	22.7	5.7%	11.4%
	Kenya	291,486	19.7	8.9%	17.8%
	Djibouti	7	0.2	0.0%	0.0%
	Somalia	14,297	7.3	1.2%	2.4%
	Total	522,850	49.9	6.3%	12.6%
Medium-cost	Ethiopia	159,568	23	4.2%	8.4%
	Kenya	152,869	20	4.7%	9.4%
	Djibouti	7	0	0.0%	0.0%
	Somalia	8,245	7	0.7%	1.4%
	Total	320,689	50	3.9%	7.8%
High-cost	Ethiopia	156,030	23	4.1%	8.2%
	Kenya	108,762	20	3.3%	6.6%
	Djibouti	0	0	0.0%	0.0%
	Somalia	1,293	7	0.1%	0.2%
	Total	266,085	50	3.2%	6.4%

Source: Authors' estimates based on the data and methods described by Liang et al. (forthcoming).

Notes: ^a Lowland areas are defined as those less than 1,500 meters in altitude. This criterion precludes some irrigable parts of Somali region (for example, around Jijiga) and Afar that are slightly above 1,500 meters, as well as some areas of Kenya that are not predominantly pastoralist.

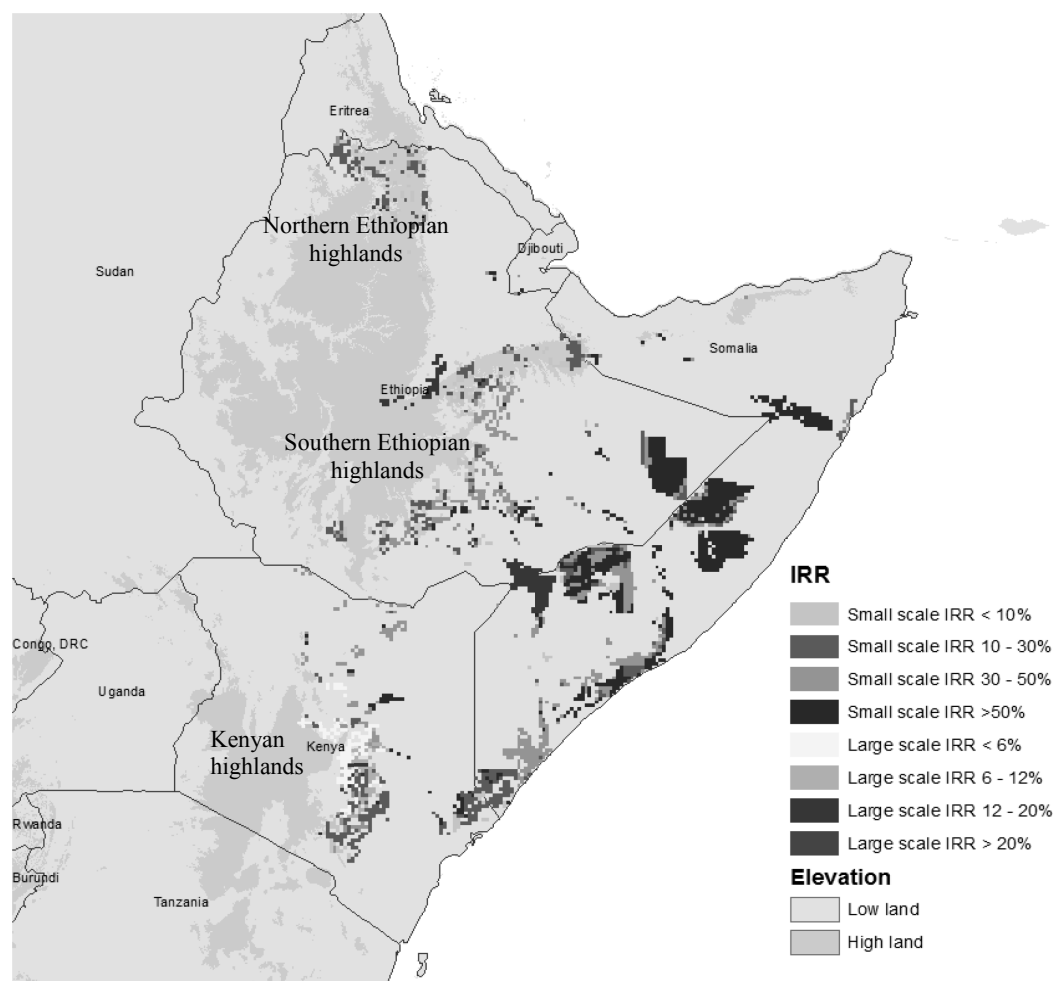
^b The low-, medium-, and high-cost scenarios, in USD per hectare, are, respectively, \$600, \$2,000, and \$5,000 for small-scale irrigation and \$3,000, \$6,000, and \$8,000 for large-scale irrigation. See Liang et al (forthcoming) for more details.

^c Large-scale irrigation consists of major dams already in construction or at least planned. Since there are no such dams planned or under construction in lowland Djibouti and Somalia, the estimates of increased area are zero.

^d ASAL population figures are derived from 2005 GIS data (Global Rural Urban Mapping Project, GRUMP) broken up into rural and urban population for areas less than 1,500 meters in altitude. To derive figures for 2020 we assume a population growth rate of 2.6 percent, which is the current growth rate of the Somali region of Ethiopia.

^e We assume that a household of 6 people operating 1 irrigated hectare can stay just above the poverty line. In fact, this scenario is probably too optimistic for several reasons. First, there is some evidence suggesting that household sizes in rural ASAL regions are actually larger. In Kenya, Little, Aboud, and Lenachuru (2009) found a household size of 6.8 in 2002, while Devereux's (2006) Somali region study found household sizes closer to 8 people. However, the 2007 population census in Ethiopia recorded average household sizes of 6 and 6.5 persons for rural Afar and Somali regions of the country, respectively. Moreover, sedentarized farming may require a smaller labor force than does pastoralism, and household sizes would normally trend down over time. We thus adopt the assumption of 6 household members, which is also closer to highland scenarios. Second, many irrigated areas may be turned over to plantation agriculture, which could have substantially lower labor intensity (and hence job creation) than smallholder farming. And third, profitably using 1–2 hectares of irrigated farmland may depend heavily on access to markets, which will often be very poor in pastoralist areas.

Figure 4.1—Map of profitably irrigable areas by lowlands and highlands of eastern Africa, by types of irrigation and internal rates of return (IRR)



Source: Authors' construction from data and methods described by Liang et al. (forthcoming).

Notes: Lowlands (highlands) are defined as areas below (above) 1,500 meters in altitude. These are the darker areas in the map. This is a standard definition in Ethiopia but may perhaps be too high in Kenya. IRR = internal rate of return.

Migration and Urbanization

In relation to alternative rural livelihoods, migration to urban areas (either in pastoralist regions themselves or to the highlands) actually looks quite promising. The Devereux (2006) study of the Somali region of Ethiopia found that urban residents were far better off in terms of income, nutrition, education, and health outcomes than were rural residents (Table 4.4). Relative to sparsely populated rural areas, cities and towns also have a huge cost–benefit advantage in providing education and health services. Urban livelihoods are also less vulnerable to drought, while remittances from migrants in highland areas or from overseas are likely to be entirely acyclical with respect to local weather patterns. In recent studies from northern Kenya, McPeak et al. (2011) and Little et al. (2004) show that placing a household member in wage employment outside pastoralism (and outside the range areas) increasingly is an important livelihood strategy that can enhance local food security and provide capital for reinvesting in the livestock sector. New technologies such as mobile telephones also reduce the transaction costs of remitting finances (for example, M-Pesa in Kenya). However, governments rarely make even internal migration easy. At the

very least, bureaucratic barriers to migration should be removed; providing urban infrastructure (particularly housing and water) can also facilitate a smoother process of adjustment.⁵

Table 4.4—Income, diet, immunization, and literacy by livelihood type in the Somali region of Ethiopia, 2005

Livelihood type	Mean income, ETB/month (excl. 0 incomes)	Dietary diversity scores (0–13 food types)	Children immunized (%)	Adult literacy (%)
Pastoral	217 (340)	4.3	24.4	13.7
Agropastoral	97 (199)	3.4	19.6	11.4
Farm	254 (345)	3.9	35.4	12.5
Urban	1,081 (1,103)	6.8	49.4	49.9

Source: Devereux (2006).

Education as a Cross-cutting Intervention

A rapid expansion of education is probably the highest return investment for positively diversifying the economy, because education has a number of benefits.

First, the population structure of pastoralist regions is heavily skewed toward the very young. Devereux’s (2006) survey found that 31 percent of the Somali region’s population is aged 0–9 years and another 28 percent is 10–19 years old. The census of 2007 confirms these numbers, with those 19 and under accounting for 58 percent of the population in Afar and Somali regions. Hence, a sizable education push would be a highly relevant intervention, and not simply in the long run.

Second, existing education outcomes in pastoralist regions are extremely poor relative to those in other regions. In Ethiopia, for example, just 11.1 percent and 15 percent of males in the Somali and Afar regions, respectively, have some primary education, as against 30–40 percent in the highland regions. For women the situation is even worse; just 9 percent and 7 percent, respectively, have some primary education. Literacy rates in pastoralist areas lag well behind those in highland areas in Ethiopia (see Figure 4.2). Pastoralist areas of Kenya are also lagging behind the rest of the country (McPeak, Little, and Doss 2011).

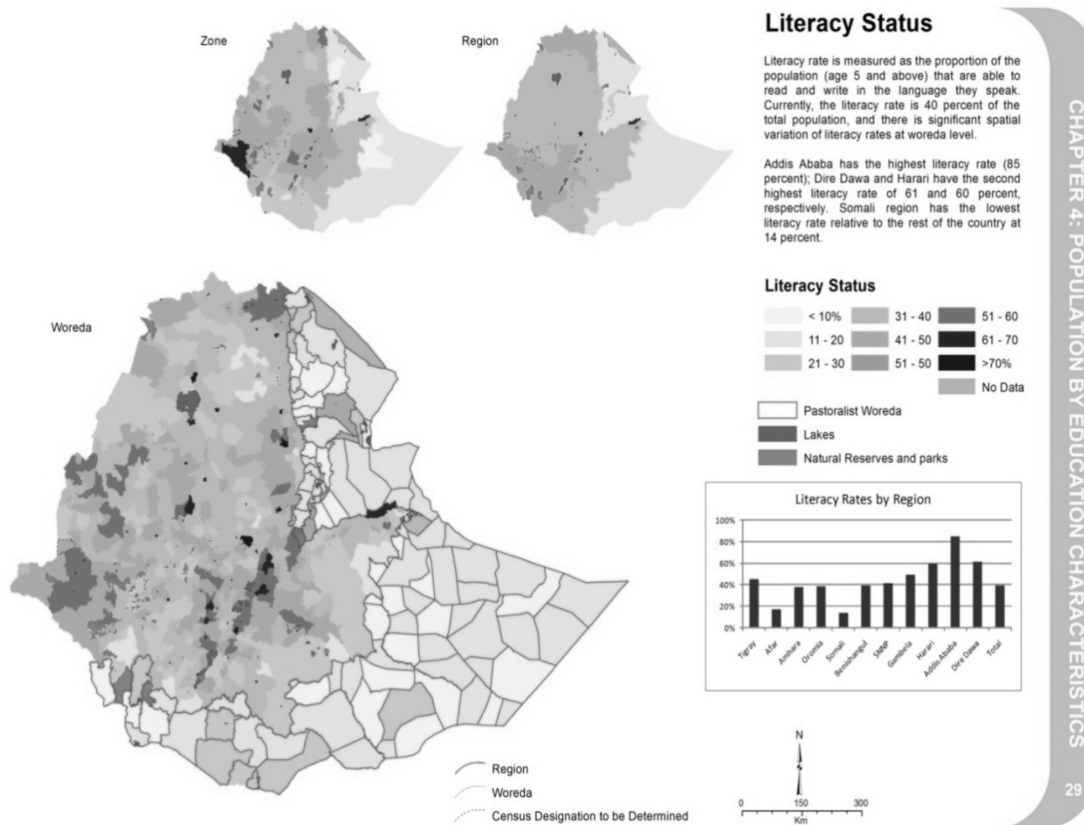
Third, education is a well-established requisite for entering gainful employment in the urban and rural nonfarm economies (Haggblade, Hazell, and Reardon 2007), and for migration (de Brauw and Carletto 2008). The same is almost certainly true in pastoralist regions (Little et al. 2001; Little et al. 2009).

Fourth, education of girls—especially secondary education—has been widely shown to reduce fertility rates in Ethiopia (Tadesse and Headey 2011), which will in turn eventually slow down population growth.

Fifth, education could have positive spillovers into policymaking by increasing the technical capacity and political empowerment of pastoralist communities. Although those benefits seem sizable, there are still significant constraints to scaling up education in pastoralist areas. Devereux (2006) found a major disconnect between the attitudes of fathers and those of mothers in the Somali region of Ethiopia. Mothers appeared to be more optimistic that education could improve their children’s lives and more enthusiastic about their daughters’ receiving an education. Many men seemed quite resistant, arguing that girls would enter another household anyway and that pastoralism itself does not benefit from education.

⁵ Without more urban job opportunities, urbanization can simply lead to new types of poverty. In the Afar region of Ethiopia, for example, the crisis of pastoralism has forced many people to settle in or around small towns, with anecdotal evidence of recent increases in theft and prostitution (Flintan 2011).

Figure 4.2—Map of literacy status in Ethiopia by pastoralist and nonpastoralist *woredas* (districts)



Source: Author's construction from Central Statistical Agency (CSA) of Ethiopia data.

Others point to the conflict between mobile livestock production systems and formal schooling:

For nomads whose direct business is animal production in dry land conditions, using a school-based education service has three serious consequences. Firstly, the household—the production team—has to be split in a way that is functional to school attendance but not to the running of a family enterprise. Secondly, herd management and livestock mobility patterns have to be modified in ways that impact on their productivity and ultimately on the reliability of the production system. Thirdly, some but not all the children in the family will be enrolled in school, as joining school-based education will prevent those enrolled from being part of the production team (Krätli, 2008). This limits the chances of success of both formal education and animal production, and to make matters worse, when children don't succeed through schooling they often become equally hard to employ in the livestock economy. (Arero 2005, 26)

Box 4.2—Education and pastoralism in Africa: A snapshot of some experience to date

Mobile schools of various kinds have been tried out in Africa since the 1970s. In Kenya two pilot projects of “mobile teaching units” were introduced during the 1974–1978 development plan. With support from UNICEF, Sudan introduced mobile schools in 1980. By 1994, there were 178 recorded between Darfur and Kordofan. In South, 11 mobile schools are recorded as operational today, all of which are self-financed. Over the last decade, as governments increased the efforts to meet the target of universal primary education, mobile schools have enjoyed a significant revival of institutional interest, particularly following a UNICEF-funded study trip to Iran by delegations from the ministries of education of Kenya, Ethiopia, and Somalia in 2006. In Kenya, mobile schools were first expanded in the early 1990s by the Arid Lands Resource Management Project. Today, mobile schools supported by the Government of Kenya number more than 50 across six districts.

Mobile schools are meant to prepare children to join a conventional school at a certain grade, which varies from country to country (for example, grade four in Kenya but grade four, five, or six in Sudan), but also to provide education that is compatible with the pastoralist lifestyle, culture, and environment. However, mobile schools in Africa can face many problems: poor equipment and training, inadequate curriculum, and marginalization from the formal system. As a result, the educational quality is usually poorer than the average in conventional schools.

Radio learning also yields some positive stories. The Ethiopian Education Development Center, for example, produced a program with a special curriculum in the Somali language, with the aim of reaching both in- and out-of-school Somali children. The program included a successful Interactive Radio Instruction (IRI) component. When the program was discontinued in Ethiopia, broadcasting continued from Hargeisa, on the other side of the border with Somaliland (Anis 2008). Most recently, the Somali Interactive Radio Instruction Program (SIRIP) uses the radio in combination with formal, non-governmental, and Quranic schools. Printed materials accompany the programs. In addition to basic reading and maths in Somali, the programs contain life skills content such as health, conflict prevention and mediation, and democracy building, and emphasize the education of girls. SIRIP uses IRI-trained teachers working in tent schools in refugee camps in the South-Central region, Somaliland in the northwest, and Puntland in the northeast. In several locations in East Africa communities themselves have funded boarding schools (Borena zone and Somali regions of Ethiopia).

In addition to efforts on the ground, there has been increasing interest among governments and development partners in providing more innovative education to pastoralist areas. There have been desk studies carried out by Save the Children (2000; 2008), the World Bank (2001), the African Development Bank (2005), UNICEF (2001), Oxfam (2005), USAID and PACT Ethiopia (2008).

Source: Krätli and Dyer (2009).

On the other hand, an extensive literature review of pastoralist education experiences in Africa, South Asia, and Mongolia painted a far more optimistic picture of both rising demand for education and the scope for effective innovation (Krätli and Dyer 2009; also see Box 4.2). Such innovations involve mobile community-based teachers who travel and live with nomadic groups, as well as community boarding schools and radio education. Many of these innovations have already been tried in the Horn of Africa with some success, although there remain significant challenges. Mobile schooling, for example, tends to involve poorly trained teachers and very limited resources, leading to very few children’s entering secondary or higher education. Boarding schools may therefore be preferable, and they also offer the likelihood of improved access to health and nutrition services (clinics, school feeding programs). A relatively minor challenge is to ensure that boarding schools are consistent with cultural and religious practices, such as separation of girls and boys, and Koranic teachings. A cross-cutting challenge for all of these mechanisms is adequate public support. Many initiatives are based in communities or nongovernmental organizations (NGOs), with limited support from governments or major development

partners. This results in general quality problems and substantial cost burdens for parents and communities. While these problems are fundamental, they are certainly not insurmountable. Expanding education services therefore looks like a high-return investment in pastoralist areas.

Summary

Diversification of livelihoods should be an essential component of the economic transformation of ASAL regions, but diversification per se is not inevitably a positive process. Much of the transformation of livelihoods that has been ongoing for several decades is related more to a negative process of being pushed out of pastoralism by droughts and resource constraints than to any positive process related to higher nonpastoralist incomes or to returns on education. Moreover, sedentary farming in the absence of irrigation does not typically lead to higher incomes (quite the opposite), while the absorptive capacity of irrigation is sizable but limited, especially if implementation is not cost-effective. Two avenues that do offer greater potential are urbanization and a big push on education. The urban population of pastoralist regions is still quite small but seemingly better off on every objective welfare dimension. The main question is whether the infrastructure (especially water) prerequisites for expanded urban settlements can be met, as well as job creation in urban areas. But urbanization and migration are likely to enhance resilience in the region because urban livelihoods are less vulnerable to drought than are rural ones. As for related improvements in education, there are a number of direct and indirect benefits, but there are obvious challenges to scaling up education in mobile pastoralist communities. However, there is also a relatively large foundation of innovative programs from both Africa and other continents that could be a source of inspiration for scaling up pastoralist education projects. Moreover, there appears to be a growing but unmet demand for education among pastoralists themselves.

5. THE SCOPE FOR LIVESTOCK DEVELOPMENT STRATEGIES IN ASAL REGIONS

In this section we turn to the pastoralist livestock sector itself, and pose two questions. First, why invest in pastoralism? Second, if policymakers should invest in pastoralism, what specifically should they aim to achieve?

Why Invest in Pastoralism?

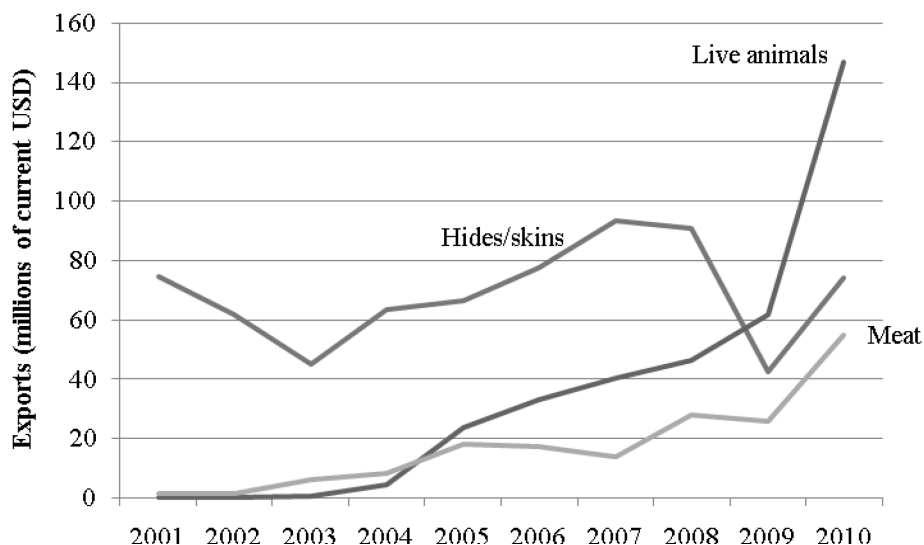
There are two basic reasons to believe that a transformation agenda in ASAL regions can ill afford to entirely neglect the pastoralist livestock sector. The first is that the sheer size of the livestock sector in these regions, measured by its contribution to employment and output, is immense, while the absorptive capacity of other sectors is limited (as we saw in the previous section). It would therefore be very difficult to create enough remunerative jobs in the short to medium term to really pull people out of pastoralism, since irrigation, education, and migration are inevitably gradual processes.

The second reason is that the pastoralist sector is relatively lucrative and has a strong comparative advantage with respect to exports to growing urban markets in Ethiopia and Kenya, and large foreign markets in the Middle East. Livestock is characterized by very high income elasticities, meaning that as East African countries continue to grow and urbanize, the demand for meat products will rise for many years to come. International meat prices are also high and predicted to remain high. Global simulations to 2050 suggest that global livestock demand will double from current levels (Seré 2009). And while the pastoralist sector faces many problems, a range of anecdotal evidence suggests that wealthier pastoralists have actually been doing very well in recent years. Figure 5.1, for example, shows very robust growth in live animal and meat exports from Ethiopia, largely on the back of some favorable industrial policies (the expansion of export abattoirs), formalization of previously informal export channels, and very high international prices. Indeed, livestock-related exports constitute a non negligible share of total export revenue in Ethiopia (10 percent). Kenya is a net importer of meat (particularly from Ethiopia and Somalia), but Somalia is a major net exporter of livestock, though it is not clear how much of that is derived from Ethiopia (indeed, in the 1970s Somalia was the largest exporter of goat meat in the world). Given these advantages, the real issues are not whether livestock can make a major contribution to regional and national economies, but whether this contribution can be pro-poor, environmentally sustainable, and resilient to natural and man-made shocks and stresses.

These are two compelling rationales for investing in pastoralism, albeit in the context of a broader transformation strategy. Yet a further source of concern is that the task of transforming pastoralism seems inordinately difficult. Pastoralism is often viewed as an excessively traditional system incapable of modernization, and there are no obvious examples of traditional pastoralist communities successfully modernizing. On the other hand, there are a number of very productive and profitable livestock systems in more developed countries that—like pastoralist systems—rely on driving livestock across large semiarid areas (for example, the Australian outback, Canada, or some US states such as Texas, New Mexico, Arizona, and Utah). Moreover, within *traditional* pastoralist communities in the developing world there are in fact a large number of wealthy pastoralists who are closely engaged in national and international markets. It is also self-evident that the agronomic principles underlying modern and traditional extensive livestock systems are essentially the same: to move animals optimally in the context of grazing, water, and land constraints. The key differences are that modern ranch systems are characterized by more clearly defined property rights (although this was not always so), far better access to technologies (improved breeds, veterinary services, and the like), weak or nonexistent human population pressures, scarcely any use of livestock for own consumption, and much greater engagement with markets. These differences would imply that transformation from a traditional to a modern extensive livestock system requires four

interlinked processes: diversification (that is, successfully transitioning some pastoralists out of pastoralism), improved property rights systems,⁶ technological intensification, and commercialization.

Figure 5.1—Trends in livestock-related exports from Ethiopia, 2000–2010 (current US dollars, millions)



Source: Comtrade. <http://comtrade.un.org>.

If these objectives can be successfully met in a pro-poor fashion, then pastoralist development will go hand in hand with a broader economic transformation, and pastoralism will itself be a much more successful sector. In contrast, the alternative path of neglecting pastoralism has several major downside risks. First, the lack of obvious comparative advantages in other sectors means that job creation and poverty reduction will be sluggish without a more vibrant livestock sector. Second, diversification out of pastoralism could easily increase vulnerability to drought and famine, especially if it involves further restrictions on mobility and a rapid growth in rainfed sedentary farming. And last but not least, pastoralist neglect could intensify spatial and interethnic inequality. As Stewart (2009) has shown, this type of “horizontal inequality” is the perfect recipe for conflict of different forms: from rebellion, terrorism, and piracy in Somalia all the way to theft and cattle raiding. In a region already characterized by ethnic tension and a massive proliferation of firearms, allowing pastoralism to deteriorate further would seem to be a recipe for disaster. Thus, there is a political economy as well as economic reasons to pursue a more balanced development strategy wherein pastoralism constitutes an important pillar of development.⁷

⁶ It is likely that privatization of land eventually will happen—but this process can probably be left until much later for several reasons. First, as was noted in the previous section, it is not obvious that there is a tragedy of the commons in pastoralist areas. Second, if some pastoralists can be pulled out of pastoralism, this could relieve land and water constraints. Third, premature privatization of land would be politically very contentious in pastoralist areas because of the poor track record of such efforts.

⁷ Perhaps Little et al best summarized two alternative pictures of pastoralist development:

A hopeful and positive scenario for 2025 is one where mobile pastoralism and agro-pastoralism still produce valuable foods and products for a growing urban population and a vibrant trading sector. Incomes in cities and domestic markets have grown along with the demand for animal products, including value-added products like pasteurized milk and butter, UHT (ultra-heat treated) milk, and processed and packaged meats.... A second and not so favourable scenario for 2025 is one where land and resource rights of pastoral communities are not protected, mobile pastoralism is restricted through the appropriation of key pastoral resources, and important migratory routes for non-pastoral uses (for example, large-scale irrigation), and market opportunities are restricted to heavily-subsidized overseas trade channels. (2010a, 27-28)

A Strategy for Transforming Pastoralist Production Systems

In the text above (and in Figure 2.3) we made reference to four pillars necessary for transforming the pastoralist agricultural sector: commercialization, technological intensification, property rights, and diversification.

Pillar 1. Commercialization

Commercialization in this context serves a number of interrelated objectives. These include household, regional, and national objectives of increasing incomes and reducing poverty, and expanding trade and foreign exchange earnings. Yet this pillar also contributes to enhancing resilience to drought and disease, and improving natural resource management, because there is a clear nexus between the lack of commercialization in pastoralist areas and issues of herd management with respect to both shocks (droughts) and stresses (changes in grazing land availability). Improving our understanding of this nexus is critical. In Section 2 we saw just how little pastoralists engage with markets through commercial destocking. In the Borena region of Ethiopia, for example, offtake rates as a percentage of initial herd size were just 2 percent circa 2000, and other studies have noted that pastoralists lose up to 15 times as many animals to drought as they do to destocking. Hence, pastoralists seem to prefer expanding and keeping their herd even though they know that a large percentage of their animals will die in the next drought. This behavior has long puzzled observers. Why not sell more livestock at the onset of drought, and then restock afterwards? The answer appears to lie not in irrationality or cultural customs but in missing markets. What are those missing or thin markets?

The first is output markets. Many pastoralists live in isolated areas with very poor access to markets and early warning systems. By the time a drought really hits, trekking animals to markets increases the risk of mortality, especially if market towns are not well equipped with feed and water facilities (McPeak, Little, and Doss 2011; Davies and Barrett 2007). And given that many other farmers are also trying to offload low-weight animals on the market, there is even a good chance that a pastoralist may be unable to sell his or her animals (or unable to sell for a good price), especially if local markets are thin and imperfectly competitive, and prices are falling because of poor market integration. In principle, however, livestock are highly tradable commodities faced with very strong domestic and external demand, including high prices. Hence, if pastoralist markets were well integrated with major domestic and international markets, then destocking would be a much more attractive option than it currently is. Indeed, emergency destocking efforts have become increasingly common during recent droughts (ILRI 2010; Pantuliano and Wekesa 2008; Abebe et al. 2008). These efforts have mostly been favorably reviewed by pastoralists themselves (ILRI 2010; Pantuliano and Wekesa 2008), and one intervention in Ethiopia in USAID's Pastoralist Livelihood Initiative claimed an approximate benefit–cost ratio of 44:1. This optimism needs to be qualified on several counts. First, the finding of a 44:1 benefit–cost ratio for an emergency destocking intervention in Ethiopia was arguably inflated by self-reporting biases and unusually favorable export circumstances.⁸ Second, destocking interventions have encountered serious problems with transport costs, inability to reach isolated pastoralists, timeliness, lack of scale, and—in the case of transport subsidies—corruption.

Even so, the partial success of these programs at least suggests that pastoralists are increasingly willing to engage with markets. Moreover, there is some evidence (Abebe et al. 2008) that the cash earned

Migratory routes for non-pastoral uses (for example, large-scale irrigation), and market opportunities are restricted to heavily-subsidized overseas trade channels. (2010a, 27-28).

⁸ The benefit–cost ratio was based on the estimated destocking of 20,000 cattle in the Borena zone of Ethiopia. However, it is not clear that 20,000 is an accurate figure because the original figure cited was a little more than 6,200. The 20,000 estimate was based on estimates produced later on by the two traders in question and supplementary estimates by other traders who were encouraged to engage in destocking in that region. Because of reporting biases, it may be that 20,000 represents an upper-bound estimate. Moreover, the intervention benefited from very favorable export circumstances to Egypt and good management (including strong technical advice). Hence there is an external validity issue as to whether such an intervention could be replicated in more normal circumstances.

through destocking can be used to save the remainder of the herd (through water, feed, and animal health expenditures), thus increasing resilience. It could also be argued that the challenges that emergency destocking faces are not insurmountable and in fact point to the more permanent constraints on commercialization, particularly poor infrastructure, lack of market access, lack of credit, and generally underdeveloped value chains. In the recent drought there is also anecdotal evidence that traders and pastoralists were more active in destocking, especially in the Borana plateau.⁹

A second missing market relates to the restocking side. One reason pastoralists may be unwilling to destock is simply that restocking is very difficult. When the drought ends, grazing lands tend to be ample and essentially free (historically, at least), meaning that a pastoralist with a small herd is not making the most of this abundance of grazing area. So in that sense destocking before a drought potentially has a high opportunity cost after the drought (Lybbert et al. 2004). But the destocking strategy is also risky because a pastoralist's capacity to restock after the drought might be constrained by limited supply, higher livestock prices, or both, especially if other pastoralists also need to restock. Hence pastoralists tend to risk drought-induced mortality in the hope that the postdrought herd size is large enough to continue as pastoralists take advantage of favorable grazing conditions. We should point out, however, that there is a huge knowledge gap with respect to restocking issues (much more so than destocking).

One also needs to investigate whether restocking could be facilitated by improvements in microfinance and index-based crop insurance. The index-based livestock insurance program—coordinated by the International Livestock Research Institute (ILRI), involving several American universities, and funded by USAID and the World Bank—is trying to promote livestock insurance in pastoralist areas based on a normalized difference vegetation index collected via remote sensing (McIntosh et al. 2011). This may also encourage microfinance institutions to expand their portfolios in pastoralist areas. While there is some justified skepticism of weather insurance,¹⁰ linking it to microfinance is a sound idea, and potentially a very cost-effective intervention, given that the private sector could ultimately foot the bill. MFIs should also expand into the provision of savings instruments. In the absence of access to financial services, pastoralists essentially save in the form of wealth. Access to savings and loans would allow them to diversify their wealth portfolio and might also facilitate greater diversification.

Another missing market pertains to services that would allow more animals to survive a drought. If more animals survived a drought, then pastoralists would not try to maximize predrought herd size and might be more willing to destock animals, knowing that the rest of the herd is more likely to survive.¹¹ Keeping at-risk animals alive during a drought has been shown to be much more cost-effective than restocking after herd deaths (Pantuliano and Wekesa 2008).¹² What interventions could help in this regard? Obviously veterinary health services, emergency feed, and better access to water are most relevant here (note the interaction between drought and disease). In recent years emergency livestock interventions have involved providing emergency veterinary services, trucking in feed and water, or drilling emergency water holes. These interventions are often very costly, however, and like many emergency interventions they tend to arrive too late for many pastoralists (Pantuliano and Wekesa 2008;

⁹ Personal communications with Professor Peter Little of Emory College, and John Graham of USAID Ethiopia.

¹⁰ Weather insurance tends to have low uptake rates. Moreover, in pastoralist areas there are three additional problems. First, drought is a covariate risk, even if there are idiosyncratic vulnerabilities at the household level. This makes insurance in pastoralist areas unattractive for financial institutions. Second, mobility and low population density make selling the product more difficult. Third, it is not clear how insurance will affect herd accumulation in the long run. If pastoralists know that they will be compensated for animal losses, then they may devote fewer resources to preventing herd losses (that is, they may decrease their mobility).

¹¹ Note the parallel with human fertility: It has long been shown that poor people facing high infant mortality risks have more children so as to ensure that a sufficient number eventually survive.

¹² One program in Afar—carried out by the Afar Pastoral Development Association—undertook a supplementary feeding program for livestock (Pantuliano and Wekesa 2008). The program showed that keeping livestock alive during drought was much cheaper than restocking after death. The program also allowed families to increase the milk supply of animals, which provided a critical source of nutrition for young children.

ILRI 2010). USAID-funded studies in Ethiopia also reported that veterinary interventions during drought were not particularly effective because water and feed were the main constraints. The external validity of this result is open to question, however, because drought can occasionally result in larger scale disease outbreaks. Moreover, while emergency vaccinations may not yield high returns, improved veterinary services in general most likely would yield high returns since disease remains a major source of mortality in pastoralist areas (Devereux 2006).

Whilst the general statement that more commercialization is needed holds true, there are two important caveats. First, in many ways pastoralist livestock markets work quite well. Yes, there are problems with imperfect competition because of the preponderance of small markets and the greater bargaining power that buyers have in times of drought, but marketing chains are also quite sophisticated in some regards. Anecdotal and some more formal evidence (McPeak et al. 2011) suggest that traders are highly responsive to arbitrage opportunities, for example, and increasingly reliant on mobile phones to seek out trade opportunities. So an important principle for interventions on the marketing side is to do no harm: many aspects of the livestock value chain work quite well.

A second caveat is that commercialization per se is far from a panacea. A recent report on commercialization in pastoralist areas by Aklilu and Catley (2009) reviewed recent efforts to commercialize pastoralism in the Horn. It noted that increased commercialization tends to benefit those with larger herds (see also Devereux 2006 and McPeak et al. 2011). Recent work by Gebru et al. (2009) and by Flintan (2011) is also suggestive of rising inequality for precisely these reasons. While rising inequality in the short run may not be of major concern (the better-off always tend to commercialize first), the poor need to be included in commercialization processes sooner rather than later. These reports suggest that a more pro-poor approach should be taken to the commercialization of pastoralist areas: building up herd sizes above a required threshold, developing road and mobile telephone networks to give poorer pastoralists better access to markets, focusing on small ruminants where these are more important to the poor, expanding animal health services, and institutionalizing livelihoods-based programming and drought-cycle management.

Pillar 2. Technological Intensification

The discussion above included numerous references to improved technologies. First, animal health services can be vastly improved. In Ethiopia there has indeed been some expansion of veterinary services, although many areas still face shortages of essential vaccines, and access for pastoralists is still quite limited (Devereux 2006). Ethiopia has also substantially expanded its livestock extension services, with at least one livestock extension officer in each district. In pastoralist areas, the establishment of community animal health workers has also been very successful for delivering cost-effective veterinary services to remote pastoral areas, including the elimination of such devastating animal diseases as rinderpest. It also appears that pastoralists themselves value animal health services quite highly, so there could be substantial scope for commercializing the sector, particularly on the back of initial public investments in educating and training animal health workers.

Second, improved breeding of cattle, in particular, can increase their milk production. Particularly promising is recent work by ILRI researchers on improving the Boran cattle breed (Haile et al. 2011). Ethiopian Boran, although a beef breed in many tropical countries, has been used as a dairy animal in many development and experimental activities in Ethiopia. The breed has been found to be fast growing, fertile, and a good milk producer, compared with other indigenous cattle breeds in the country. The growth, reproduction, and milk production performance of Boran has been improved in different parts of the world, including Kenya, South Africa, Australia, and the United States. This indicates the huge potential of the breed that could be tapped if an appropriate breeding strategy supported by proper management could be designed and fully implemented. At the same time, it needs to be remembered that breed improvement in pastoralist areas will often be limited given the need for drought tolerance.

Third, Little et al. (2010c) have emphasized the critical importance of infusing evidence-based range management practices into the pastoralist policy process. The new consensus on range management

sees mobility as one of the key factors behind drought management, but this idea seems not to have been absorbed by governments in the region. Improved monitoring of grazing and water resources is also a very real possibility, as reflected by developments such as the Livestock Early Warning Systems.

Finally, there is a range of information and communication technology (ICT) based innovations that could have a major impact on commercialization and resource management, including the extension of mobile telephones (uptakes and coverage are very low in many pastoralist areas), early warning systems (where ICTs play a role in monitoring and dissemination), index-based livestock insurance, and extension services.

Pillar 3. Property Rights: A New Social Compact for Pastoralist Areas

Pastoralists face both threats and opportunities. The major threat to pastoralism relates to land restrictions. Encroachment from cropland expansion, leasing of pastoralist lands to foreign firms and private domestic investors, the spread of *Prosopis*, interethnic land and water disputes, and increasing trends toward fencing off community lands all threaten the pastoralist's ability to move herds around (Flintan 2011). This movement of herds across seasons and years is a critical component of enhancing productivity and incomes, and improving resilience, as recent reviews by ILRI (2010) for Kenya, and Little et al. (2010a, 2010b, 2010c) for Ethiopia make clear. It needs to be reiterated that this kind of mobility is just as essential to modern ranches in the United States and Australia. As things currently stand, however, pastoralist land use rights are often not well enshrined in law and often very poorly enforced in practice. Little et al., for example, came to the following conclusion on the situation in Ethiopia:

The wording of the constitutional clauses pertaining to farmers and pastoralists is remarkably similar, but the reality has been quite different. Despite the ultimate control of land by the state, the gradual codification of land rights has improved the tenure security for farmers who pay land tax and now can often register their use rights. In contrast, the land rights of Ethiopian pastoralists have become less secure over time. Specific laws to implement pastoral land rights have not been developed.... Recent appropriation of communal pastoral grazing land for large-scale irrigation schemes, private ranches, and commercial enterprises seems to lack participation, and is at odds with promoting livestock production and trade ... (2010c, 22)

The situation has improved in Kenya, where pastoralist land rights are more unambiguously enshrined in law, but in the entire region the nature of pastoralists' mobility and seasonal use of *unoccupied* land leaves their indigenous tenure systems unprotected by modern legal systems. Moreover, higher food and land prices have encouraged a range of small-scale land grabbing by outsider investors, which in turn is encouraging pastoralists to fence off and privatize community land. This is arguably leading to the breakdown of the community property rights that are so essential to the pastoralist system. These trends need to be stopped, not only as an issue of fairness but as an issue of economic efficiency. There is quite a sizable literature on what kinds of property rights systems could protect community grazing lands, but the required changes need to take place at both central and local government levels (Flintan 2011).

However, the other part of a new social compact between pastoralists and governments relates to the tremendous untapped capacity for the pastoralist sector to contribute much more to foreign exchange and tax revenue. In Ethiopia, especially, the forgone revenue and foreign exchange earnings due to informal trade are quite sizable. Little et al (2010c) noted that unofficial cross-border exports have been estimated to amount somewhere between US\$250 million¹³ and \$300 million per year. But while informal trade is regarded as illegal trade by governments, onerous government regulations and insufficient administrative infrastructure are also an important explanation of the persistence of informal trade. Ethiopian traders report that they would be interested in bringing this trade into line with rules, but as reported by Aklilu (2008) and Devereux (2006), they are required to visit a dozen or so offices to process

¹³ All dollar amounts are in US dollars.

export documents, which is costly in terms of both finances and time. A Food and Agriculture Organization of the United Nations (FAO) project aimed at improving capacity in Ethiopian and Somali trade linkages negotiated the legal export of cattle from the Somali region of Ethiopia to the Somalian port of Berbera, resulting in a rise in foreign exchange earnings at the Jijiga customs office from zero in 2003 to \$4.27 million from 2004 to mid-2005. However, the project was not scaled up. Somali region traders interviewed by Little et al. (2010b) also cited ongoing problems with formalizing trade, particularly that obtaining an export license required travel all the way to Dire Dawa, rather than Jijiga or smaller towns, and all said that government customs and revenue stations on border towns had nowhere near the capacity to process even informal exports. And as new areas open up for cross-border trade (for example, the Sudan), the government is not seen as responsive in shifting investment and personnel to meet the changing demands of the export markets. Anecdotal and indirect statistical evidence suggests that in Ethiopia things have improved on this front, though there is still a long way to go.

Pillar 4. Diversification

As we noted above, modern and profitable pastoral systems—such as ranching—are characterized by relative land abundance. In the Horn of Africa, however, pastoralist populations have grown at unprecedented rates. With respect to the Borena region of Ethiopia, Desta and Coppock (2004) estimated that there may be three times as many people per unit area as can be supported by the traditional pastoral production system. Diversification is therefore a must. If encouraged well, diversification will minimize the risks that pastoralist households face and increase the returns on pastoralism by making more land available. In the past, however, diversification seems to have largely been the result of households' that are being pushed out of pastoralism through drought-induced livestock mortality and other shocks, or through loss of access to grazing land. This has meant that those who were forced out of pastoralism became poorer than those who were able to stay in pastoralism.

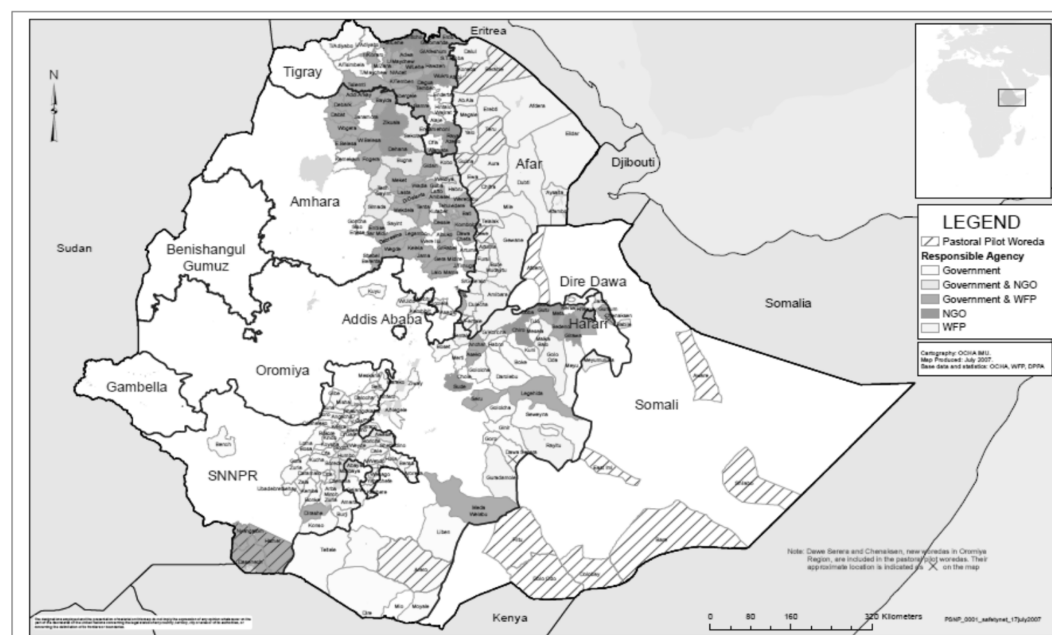
Box 5.1—Safety nets and emergency interventions: Problems and potential

Much of the existing development activity in pastoralist areas has focused on drought management, along with a more recent push to provide productive safety nets. While these instruments should play a role in promoting longer run development, by themselves they will not be sufficient. Moreover, there are many implementation bottlenecks not always fully appreciated. On drought management, for example, the evidence suggests that coordination failures, late and incomplete interventions, and the absence of basic infrastructure and threshold levels of commercialization all make emergency livestock interventions fairly ineffective (Pantuliano and Wekesa 2008; ILRI 2010). In terms of productive safety nets, there has also been significant media coverage of the fact that Ethiopia, in particular, has a large social safety net program already in place in *some* pastoralist areas (see Figure 5.2). The Productive Safety Net Program (PSNP) offers food or cash in exchange for labor aimed at building community assets (or without exchange in the case of the most vulnerable labor-constrained households), and is targeted at the poorest districts in the country. Recent evaluations of PSNP by IFPRI have found that PSNP performs quite well in terms of targeting the poor but at best has a marginal impact on food insecurity or asset accumulation. Graduation rates out of PSNP are also very low. Moreover, in pastoralist regions the program has actually performed quite poorly so far. Specifically, while the safety net component is indeed providing some social protection, the productive component has worked much less effectively in the pastoralist lowlands than in the highlands because of the very different farming systems. Of course, the extension of PSNP to pastoralist areas is still quite new and could be regarded as being in a trial phase, but there are clearly a number of challenges to tailoring the program to pastoralist livelihoods. First, targeting is particularly difficult in a pastoralist setting, where chronic poverty may be less of a problem than acute drought-induced poverty. Because PSNP does not give entitlements to all but only to those identified as poor or food insecure (unlike the National Rural Employment Guarantee Scheme in India, for example), a household thrown into poverty by drought cannot easily get access to PSNP entitlements. Second, the program needs to identify asset-building activities that are most useful for pastoralists themselves. One promising trial program (the PSNP Plus Livestock; see map) involves giving PSNP participants a five-day training course that covers fattening techniques, feeding, veterinary services, business skills, and linking to markets. But clearly a great deal of learning, tailoring, and expansion would need to take place before PSNP can be said to have made a substantial contribution to improving the resilience and productivity of households in pastoralist regions.

Box 5.2—Safety nets and emergency interventions: Problems and potential

Much of the existing development activities in pastoralist areas have focused almost on drought management, along with a more recent push to provide productive safety nets. While these instruments should play a role in promoting longer run development, by themselves they will not be sufficient. Moreover, there are many implementation bottlenecks not always fully appreciated. On drought management, for example, the evidence suggest that coordination failures, late and incomplete interventions, and the absence of basic infrastructure and threshold levels of commercialization all make emergency livestock interventions fairly ineffective (Pantuliano and Wekesa 2008; ILRI 2010). In terms of productive safety nets, there has also been significant media coverage of the fact that Ethiopia, in particular, has a large social safety net program already in place in *some* pastoralist areas (see the map below). The PSNP offers food or cash in exchange for labor aimed at building community assets (or without exchange in the case of the most vulnerable labor-constrained households), and is targeted at the poorest districts in the country. Recent evaluations of the PSNP by IFPRI have found that PSNP performs quite well in terms of targeting the poor, but significant impact on food insecurity or asset accumulation occurred only when the PSNP is implemented as planned in terms the extent of beneficiaries’ participation in the Public Works component and level and timeliness of corresponding payments. Graduation rates out of the PSNP are also low. It is noteworthy that these outcomes vary across regions. Moreover, in pastoralist regions the program has not been fully operational. As a consequence, while the safety net component is indeed providing some social protection, the productive component has yet to work effectively in the pastoralist lowlands than in the highlands. In this regard, there are clearly a number of challenges to tailoring the program to pastoralist livelihoods. First, targeting is particularly difficult in a pastoralist setting where chronic poverty may be less of a problem than acute drought-induced poverty. Because the PSNP does give entitlements to all but only to those identified as poor/chronically food insecure (unlike the National Rural Employment Guarantee Scheme in India, for example), a household thrown into poverty by drought cannot easily get access to PSNP entitlements (though there are other sources of support). Second, the program needs to identify asset-building activities that are most useful for pastoralists themselves. One promising trial program (the PSNP Plus Livestock; see Figure 5.2) involves giving PSNP participants a five day training course that covers fattening techniques, provision of feed, veterinary services, business skills training, and linking to markets. But clearly a great deal of learning, tailoring and expansion would need to take place before PSNP can be said to have made a substantial contribution to improving the resilience and productivity of households in pastoralist regions.

Figure 5.2—Ethiopia: Productive Safety Net Program (PSNP) Woredas and Responsible Agency in 2007



Source: UN Office for the Coordination of Humanitarian Affairs (2007).

How, then, can positive economic transformation take place? Devereux and Scoones nicely summarized the appropriate principles underlying efforts to diversify these regions:

Rather than imposing a single model on all pastoralist families (from “do nothing” through to “mass sedentarisation”), policy-makers should provide appropriate support to whichever pathway particular groups, families, and individuals choose to follow. Two key principles are to expand people’s options and to maximise their physical, economic, and social mobility. (2008, 17)

The expansion of options could be facilitated by increased education and vocational training, microfinance, irrigation, and an array of policies that could facilitate migration and remittances. Finally, voluntary migration is also an option. Remittances from migrants tend to be countercyclical with respect to pastoralists’ booms and busts; they therefore provide an important source of risk-coping capacity.

6. CONCLUSIONS

This paper has summarized the most recent evidence on the constraints and opportunities facing pastoralism in the Horn of Africa. In many regards the pastoralist livestock sector faces a bright future, with ample prospects for rising national, regional, and international demand. But the sector also faces long-standing constraints—particularly drought—made worse by secular trends such as loss of grazing land and overpopulation. Even so, it is extremely hard to justify polemical positions such as ignoring livestock development, or putting all eggs in that basket. The best path forward is a balanced path involving both movements out of pastoralism and the transformation of pastoralism into a more commercialized and resilient sector. Acceptance of such a position leaves two questions more open to debate. First, what precise balance do we need between livestock and nonlivestock interventions? Second, how do we bring about the desired transformation in the livestock and nonlivestock sector, particularly given the unique constraints of populations that are scattered, mobile and political disenfranchised?

These two questions are embodied in Figure 2.3. The question of balancing investments depends on filling in some key knowledge gaps on issues such as these:

- The carrying capacity of the environment under different human and livestock populations (stresses) and the interrelated resilience of this environment to droughts, floods, and conflict (shocks)
- The absorptive capacity and profitability of irrigation projects (an issue we provided some first-cut estimates of in Section 4)
- The potential for migration and nonfarm diversification within the region and out of the region
- The cost-effectiveness and time frame of different interventions in livestock, irrigation, nonirrigated farming, and rural nonfarm development, and in cross-cutting interventions such as education, family planning policies, microfinance, and other policies pertaining to community and gender development

The question of how to invest also requires filling in knowledge gaps through the combination of greater on-the-ground experimentation and rigorous program evaluation. Impressive arrays of new ideas and technologies have been touted and trialed in pastoralist areas, but so far the collective knowledge base is slight and interventions at scale are few and far between. Probably the most important constraint is physical isolation and mobility. Although at an advantage for livestock rearing, isolated and mobile populations are severely disadvantaged in terms of accessing markets and public services. Overcoming this constraint in innovative ways will be critical to the successful development of these regions, irrespective of the balance between livestock and nonlivestock interventions.

At a detailed level, these issues are too complex to explore here, but we have already made reference to a number of innovative service delivery mechanisms (see the bottom of Figure 3.1 in Section 3 for a noncomprehensive list of potential interventions), including the following:

- Mobile telephones, with implications for everything from better farm gate prices to meteorological reports and early warning systems, to microfinance (for example, M-PESA), to human and animal health extension services, and so on
- Mobile schooling, long-distance schooling, and boarding schools
- Improved early warning systems
- Weather-based index insurance
- Livestock development clusters that link output markets to improved infrastructure (roads, feed and water resources) and access to other relevant services (animal health, finance, and so on)

The best path forward is (1) to systematically fill in these knowledge gaps through a research program that is both coordinated enough to fit in all the essential pieces of the puzzle and decentralized enough to draw upon the different disciplines of greatest relevance, and (2) to analyze these regions in a spatially disaggregated fashion. But suffice it to say, the current state of weak evidence inhibits both the returns on investment and the commitment of regional governments, who often underappreciated the economic potential of the livestock sector.¹⁴ Hence, an improved evidence base will also be an important platform for a broader consensus on how best to achieve a meaningful economic transformation of the Horn of Africa.

¹⁴ For example, a major report on pastoralist policies in Ethiopia emphasized that weak evidence from the region was a cause of the neglect of pastoralism by Ethiopian policymakers:

Aside from fostering practical work on drought cycle management and commercial de-stocking in droughts, the new thinking in rangeland ecology [has] had little effect [on policy]. Donor-funded projects ... reinforced this trend by emphasizing pastoral rights, voice, advocacy, and political mobilization. Because the scientific basis for these projects was often unclear or unstated, senior Ethiopian administrators could dismiss this work for a lack of rigorous data and documentation. (Little et al. 2010c, p. 22)

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