
Avoiding Disaster: Diversification and Risk Management among East African Herders

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ABSTRACT

This article addresses processes of livelihood diversification among pastoralists in the rangelands of northern Kenya and southern Ethiopia. The objectives of the article are threefold: (1) to suggest a theoretical framework for addressing income diversification among pastoralists with reference to current literature and databases; (2) to present a case study on pastoral income diversification based on preliminary field research in northern Kenya and southern Ethiopia; and (3) to summarize current understandings of pastoral diversification while pointing to additional empirical research needs. By showing how comparative analyses in the region have been constrained by theoretical and data deficiencies, the article explores ways in which income diversification differs by what are termed conditional, opportunity, and local response variables. Climate, distance to market towns, gender, wealth, and education are attributes covered by these variables and discussed in the article. The conceptualization and case study provide useful bases for conducting comparative research on pastoral diversification in East Africa specifically, and in sub-Saharan Africa generally.

INTRODUCTION

Livestock herders of East Africa increasingly pursue non-pastoral income strategies to meet consumption needs and to buttress against risky shocks caused by climatic fluctuation, animal disease, market failure, and insecurity. While herders have always sought a degree of herd diversification and pursued different land-use strategies to cope with risk, contemporary patterns reflect an important transformation. Recent studies in the region show marked changes in diversification strategies that increasingly engage the market, even in areas considered to be very remote (Holtzman, 1996; Kituyi, 1990; Little, 1992; Little et al., 1999; Straight, 1997; Zaal and Dietz, 1999). To assess the benefits and costs of these changes, the relationship between income diversification and pastoral risk management should be examined. Has diversification allowed herders to better cope with the region's high levels of economic, political, and ecological risk — or has it exaggerated problems?

While the theme of income diversification among East African pastoralists has received descriptive treatment in the literature, little comparative work has been done. This gap is especially noticeable when compared with the substantial analytical work on diversification that has been conducted in agrarian regions of Africa (see Bryceson and Jamal, 1997; Davies, 1996; Ellis, 2000; Reardon, 1997; Reardon et al., 1994).¹ What has hampered comparative studies of pastoral income diversification is the absence of good longitudinal data and an agreed-upon definition of what constitutes diversification among African herders, and the lack of conceptual frameworks to distil theory from the region's excellent descriptive materials and site-based analyses. These constraints have resulted in numerous contradictory statements about the potential role(s) of diversification in risk management among pastoral herders. For example, cultivation is seen by some as a viable risk management strategy (Campbell, 1984; Smith, 1998), while others view it as an unsustainable (even destructive) option that even accentuates risk (Hogg, 1987, 1988). Similar inconsistencies are revealed in debates about the role of the market in pastoral diversification, with some condemning and others applauding it (see Bailey et al., 1999; Fratkin, 1991; Hogg, 1986; Holtzman, 1996; Little, 1992). Local differences — in terms of market town proximity, access, and market dependence for consumption needs (that is, grain) — that might explain discrepancies in market benefits and costs are usually left out of such deliberations. In short, too much discussion remains anchored on single site studies rather than on systematic comparisons across ethnic groups and locations.

This article is a preliminary attempt to explore the issue of income diversification across different herding groups of East Africa. It is not meant to be a definitive statement about the causes and consequences of pastoral diversification — the objectives are somewhat more modest than that. They are to (1) suggest a framework for addressing income diversification among pastoralists with reference to current literature and databases; (2) present a case study on pastoral income diversification based on preliminary field

1. A limitation of the non-farm literature in contributing to an understanding of pastoral income diversification is the fact that unlike 'crops', livestock is a source of subsistence and income, as well as a form of capital and savings that can yield substantial annual returns. For example, in their comparative analysis of rural Tanzanian and Ethiopian economies, Dercon and Krishnan (1996: 860) demonstrate that 'investment in livestock is by far the most popular productive investment identified by the households . . . livestock provides an attractive form of investment, particularly in view of the few alternatives available in the local economy'. The issue is even more complicated in cases where herder diversification can actually enhance the capital and savings function of livestock. Indeed, there is considerable empirical evidence that income from non-pastoral activities frequently is invested in livestock; while keeping animals off devalued markets by earning income from non-pastoral pursuits is also a means of preserving herd capital (Little, 1992). In short, income diversification among pastoralists does not necessarily equate to a diminished interest in livestock investments and production.

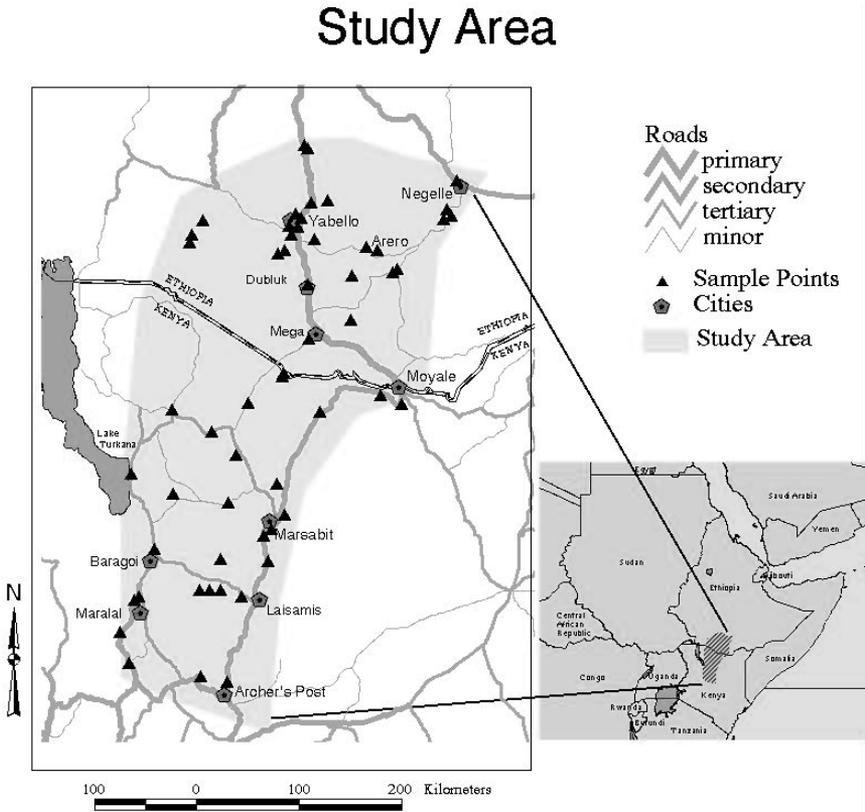
research in northern Kenya and southern Ethiopia (see Smith et al., 1999 and forthcoming); and (3) summarize current understandings of pastoral diversification while pointing to additional research needs. The article draws on research and literature that covers an area of approximately 10,000 km² and encompasses parts of the rangelands of southern Ethiopia and northern Kenya. The study region is bounded by the towns of Hagre Mariam and Negelle in Ethiopia, and Isiolo and Marigat in Kenya (see Figure 1) and includes the Boran, Gabbra, and Guji peoples in Ethiopia, and the Ariaal, Boran, Il Chamus, Gabbra, Rendille, Samburu, and Tugen peoples in Kenya.² All of these ethnic groups are historically herders, although many currently include segments of non-herders and pursue a range of economic strategies.

In this article, we treat pastoral diversification as the pursuit of any non-pastoral income-earning activity, whether in rural or urban areas. This definition includes (1) any form of trading occupation (for example, selling milk, firewood, animals, or other products); (2) wage employment, both local and outside the area, including working as a hired herder, farm worker, and migrant labourer; (3) retail shop activities; (4) rental property ownership and sales; (5) gathering and selling wild products (for example, gum arabica, firewood, or medicinal plants); and (6) farming (both for subsistence and cash incomes). The selling of livestock and milk products at the 'herd-gate' are not included in this definition, nor are herd diversification strategies that, for example, instigate a mix (diversity) of animal species (for example, cattle, camels, sheep, and/or goats) to cope with drought and other hazards (see McCabe, 1996). The definition approaches diversification as a cyclical rather than unilinear process, whereby herders can combine different income strategies at different points in their life cycle (see Holtzman, 1996; Little, 1992). For instance, a male pastoralist may engage in wage employment to earn income for bridewealth, and then later on move back into full-time pastoralism.

A comment is warranted here about the relationship between risk and diversification. While risk is an important reason why herders might wish to diversify their income sources, it is not the only one and in many cases it may not be the most important one. The causes of pastoral diversification are multi-faceted and resistant to simplistic explanations. Part of the reason

2. The study region corresponds to the area where the Global Livestock–Collaborative Research Support Program (GL-CRSP) on 'Pastoral Risk Management' (PARIMA) is working (also see Acknowledgments at the end of the article). The GL-CRSP project is a collaborative effort of the Utah State University, the University of Kentucky, Cornell University, Egerton University (Kenya), and the International Livestock Research Institute (ILRI). It addresses the causes and consequences of different types of risk among pastoralists; the means by which herders manage — economically, environmentally, and culturally — endemic and periodic risks; and the grassroots initiatives by herders to address the difficulties associated with high levels of risk.

Figure 1



Note: This map was developed by Paul Box of Utah State University and is based on Smith et al. (1999).

for this is that within the designated study area we are dealing with heterogeneous populations and ecosystems. Considerable intra-community differences add to the complexity, in that motivations for diversification vary considerably along both wealth and gender lines. Rich and poor herders pursue diversification for different reasons, and risk may not be equally important for both groups. Despite these differences, it is commonplace in the literature to simplify and homogenize the relationship between risk and diversification, and to assume that diversification is, firstly, a strategy that always lowers exposure to risk and, secondly, 'scale'-neutral in that all members of a community have similar exposure(s) to risk and coping opportunities (see Bernstein et al., 1992; Dercon, 1998; Ellis, 1998, 2000).

In this article, we will demonstrate that important exceptions are found for each of these points.

COMPARATIVE FRAMEWORK

Borrowing from the definition of Smith et al. (1999: 4), risk is defined in this article as ‘uncertain consequences, and in particular exposure to potentially unfavorable circumstances’. If risk can be avoided or minimized without undue economic and social costs, herders will try to do so because it is an undesirable state of affairs. Although this is a simple characterization of risk, it will suffice for this discussion and is compatible with pastoralists’ own concept of the term.

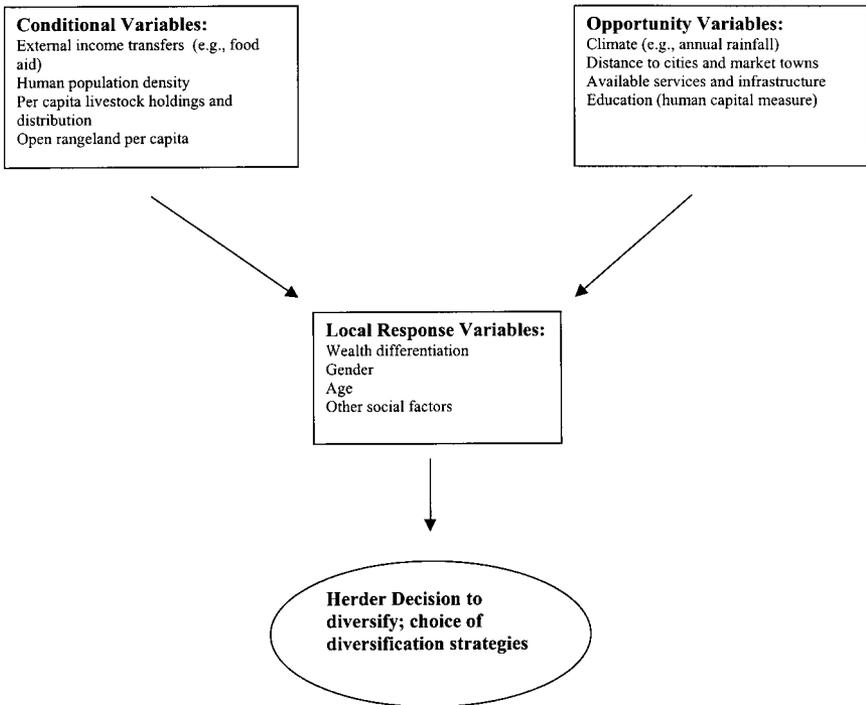
There is little doubt that herders of East Africa are exposed to high and endemic levels of climatic, economic, and political risks, even when compared to other risk-prone areas of the region. This is especially true for the rangelands of northern Kenya and southern Ethiopia (the study region), where herders often inhabit areas of widespread insecurity and conflict, climatic instability, destructive livestock diseases, and unreliable markets and infrastructure. While there are clear geographic differences in levels of risk exposure in the study region and in East Africa generally, there are also considerable differences in terms of opportunities to diversify. These differences have not been well understood by development planners in the region, who still pursue ‘one fits all’ policies and programmes, nor by researchers who fail to appreciate how differences in social, economic, and ecological variables affect opportunities for diversification.

A Model of Pastoral Livelihood Diversification

The model presented here supports the position that diversification mainly affects the wealthy and poor herders, and not middle-wealth groups of pastoralists who may lack sufficient motivation and/or pressures to diversify.³ For the relatively rich herders, diversification is a strategy of accumulation or investment; for the impoverished it is a matter of survival (see Barth, 1964; Little, 1985, 1992). The poor are ‘pushed’ into diversification out of necessity and it is this population segment that is growing most dramatically in the rangeland areas. As a start, three different sets of variables are distinguished in the model that influence herder decisions to diversify or not,

3. As with any rural group in Africa, wealth categories are relative. When the article uses the terms rich, middle, poor, or very poor they are not meant to imply absolute levels of wealth or poverty. On a regional scale pastoralists are considered to be among the most impoverished groups in East Africa.

Figure 2. Model of Pastoral Livelihood Diversification



and what types of strategies to pursue (see Figure 2). These include: (1) conditional variables; (2) opportunity variables; and (3) local response variables. For heuristic purposes, each category can be treated independently, although interactions among them often exist.

- *Conditional variables*: these factors address system-level phenomena and indicate whether conditions are conducive for pastoral diversification. They include such measurements as per capita livestock holdings, population density, and availability of rangelands.
- *Opportunity variables*: these help to explain the types of diversification opportunities available. They include measurements of climate (for example, rainfall), distance to the market, proximity to towns of various sizes, and education. Opportunities for diversification will vary considerably *vis-à-vis* these variables.
- *Local response variables*: even if system-level conditions and opportunities favour certain patterns of diversification, local-level variables can facilitate or constrain responses. These variables help to explain which herder groups will respond or not respond; who will share in the benefits and costs of diversification; and how certain social processes

may facilitate or constrain diversification. Local variables include measurements of gender, wealth, age and so on.

Comparative Analysis of Variables

Discussions of pastoral diversification often fail to appreciate the ways in which the simplest variables — for example, annual rainfall — can explain particular patterns. We opted to include in our model a limited number of variables that could be measured relatively easily, although data on them were not always available.⁴ In doing this, important qualitative factors such as local, social, and exchange networks have been omitted.

The model presents eleven general variables to assess pastoral diversification. These are indicated in Figure 2, while the application of a subset of these in the study region is presented in Appendix Table A1. Although not in the study region, the Orma of Tana River District, Kenya, the Maasai of Kajiado, Kenya, and the Mukugodo of Laikipia, Kenya, are included in Table A1 because they are related to groups in the region and are located relatively nearby, and because good data exist for them (see footnote 4). Despite an effort to include variables that were easily identifiable, certain inconsistencies became apparent. Some variables are not treated at all in the literature, while others are defined differently across study sites and thus constrain comparative work. For example, in some studies livestock are converted into Tropical Livestock Units (TLU),⁵ while in other studies they are equated with a Standard Stock Unit (SSU) based on market value or on local exchange rates. In other cases, non-pastoral activities and wealth categories are defined differently across locations. Table A1 is therefore an attempt to summarize available data according to a group of variables assumed to be important in explaining diversification among herders.⁶

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4. In a review of existing literature on diversification for our study region (southern Ethiopia and northern Kenya) and in the selection of relevant variables, we used studies of the Ariaal (Fratkin, 1991; Fratkin and Roth, 1990); the Ethiopian Boran (Coppock, 1994; Desta, 1999) and Kenyan Boran (Hogg, 1980, 1986, 1987); the Il Chamus (Little, 1992); the Gabbra (O'Leary, 1985, 1990); the Rendille (O'Leary, 1985, 1990; Fratkin et al., 1996; Fratkin and Smith, 1995); the Samburu (Holtzman, 1996, 1997; Perlov, 1987; Sperling, 1987, 1989; Straight, 1997); and the Tugen (Vedeld, 1990; Vedeld and Lusenaka, 1991). Because of the richness of their data, some case studies outside the study region were also reviewed and included in the analyses (for additional details, see Little et al., 1999). These are the Kenyan Maasai, who are located about 250 km south of the study region (Bekure et al., 1991; Campbell, 1978, 1984; Kituyi, 1990; Zaal, 1998; Zaal and Dietz, 1999); the Boran-related Orma of northeastern Kenya (Ensminger, 1992); and the Mukogodo, who are located on the southern boundary of our project's study region (Herren, 1991).
 5. A TLU is an animal unit equivalent to about 250 kg liveweight. For the purposes of this paper, it is equivalent to 1 head of cattle, 8 goats or sheep, or 0.8 camels.
 6. The authors apologize in advance for any misinterpretations or miscalculations of other authors' research data and studies.

Some of the variables in Figure 2 and Table A1 require explanation, as well as empirical examples. Climate (annual rainfall), for example, provides indications of aridity and the feasibility of rainfed agriculture. Although not always the best indicator of agricultural and drought risk, these rainfall data are generally available for the study region. As Table A1 depicts, annual rainfall varies from over 1000 mm in the highland areas of the study region, to less than 200 mm in the desert region of northern Kenya, a place where virtually no rainfed agriculture is possible. A more accurate assessment of climatic risk requires analyses of variance and standard deviations — rather than statistical means — and data on daily and monthly rainfall distributions. For the purposes of this exercise a measurement of average annual rainfall is adequate.

Human population density and per capita livestock holdings are also ‘conditional’ variables in the model that point to certain pressures affecting pastoral diversification. While population density is a crude measurement that varies considerably across the study region, it gives an indication of grazing availability and of the need to intensify into non-pastoral activities. Generally, the more people there are, the less land is accessible for communal grazing and the greater the need to diversify. (A better indicator than population density is per capita rangeland availability because it relates directly to available pastures, but this measurement is unavailable for most of the study region.) In the study region, human population density varied from a high of 41 per km² in parts of highland Baringo, Kenya (Vedeld and Lusenaka, 1991) to about 1 per km² in the Chalbi Desert, Kenya (O’Leary, 1985). While demographic data are helpful in understanding diversification, their aggregation at district levels⁷ reduce their usefulness since population distribution in the region is highly uneven and strongly localized (see Little, 1994a). Nonetheless, groups in Table A1 with a relatively high average population density (Tugen, Il Chamus, and Mukugodo) depend heavily on non-pastoral sources of income, while those (for example Rendille and Gabbra) with a low population density show minimal levels of diversification.

A fourth variable in the model, wealth differentiation, is used to capture household-level differences in diversification. Although few studies differentiate income-earning strategies by wealth level, even fewer disaggregate income activities by gender. This critical ‘local response’ variable is included in the model, but requires additional research. Gender-specific diversification strategies are presented in some databases and an effort was made to address this variable. However, with few exceptions (cf. Zaal, 1998) the information is very incomplete. For instance, good qualitative information is available on the frequency with which a non-pastoral activity is dominated by a particular gender group — petty trading (milk and firewood) and

7. In Kenya the ‘district’ is the key administrative unit for data collection; in Ethiopia it is the *woreda*. They can be greater than 75,000 km² in size.

small-scale vegetable production among women (Fratkin and Smith, 1995; Smith, 1998) and cattle trading among men (Little, 1992) — but quantitative data are sparse.

Another variable, ‘external income transfers’, mainly addresses food-aid transfers, which are prevalent in many parts of the study region (especially the Baringo, Samburu and Marsabit Districts in Kenya). Although rarely addressed in sufficient detail, food aid is a critical ‘conditional’ variable since it can create disincentives to diversify by creating artificial income subsidies, and encourage poor herders to settle around food-relief centres. In most studies, only the absence/presence of food-aid transfers is indicated, and only anecdotal data on food aid amounts per recipient and their income value are provided (see Table A1). In certain parts of the study area, more than 40 per cent of the population receive some food aid during the year (GFA, 1993; Kielmann et al., 1994) and during the most recent drought (1999–2000) the number was much higher (see United Nations, 2000). As Table A1 demonstrates, more than 70 per cent of studies indicate the presence of food aid, with data more readily available for Kenyan than Ethiopian sites.

Distance to urban centres and the scale of services and infrastructure available in those centres are critical ‘opportunity’ variables. Opportunities for trade, informal sector activities, and waged employment are often affected by these factors, as the case study discussed later in the article will show. For instance, small rural market centres open up petty trading opportunities, but do not offer the types of wage employment opportunities that are found in a regional or primate city. In general, Kenyan sites (Il Chamus and Tugen) at the southern end of the study region where access to major urban centres (including Nairobi) is relatively easy, show higher levels of diversification than other locations (such as Gabbra and Rendille).

If we look at the data under the headings ‘sources of income’ and ‘data by wealth category’ in Table A1, several trends emerge. The first is that diversification is a relatively recent phenomenon dating from the 1970s in some areas and from the 1980s in others. A comparison of the Orma data from 1980 with those of the late 1980s (Ensminger, 1992) shows that dependence on livestock (LS) income has decreased considerably, from about 75 to 51 per cent of household incomes for some herders. Reference to other ethnic groups with longitudinal data in Table A1 show similar patterns of diversification, with the exception of the Maasai who have high levels of specialization and per capita livestock holdings (discussed below).⁸

8. In his insightful and important study, Zaal calculates per capita Maasai livestock holdings on the assumption that the Maasai own all the livestock in the Kajiado District, Kenya, even though an estimated ‘173,000 non Maasai currently live in the district’ (Zaal, 1998: 65). We find this a fairly tentative premise that requires empirical validation and that may explain why the livestock ownership figures for the Maasai are so high relative to other groups.

In the case of Ariaal, the number of household members engaged in wage labour (WL) almost doubled between 1976 and 1985 (see Fratkin, 1991).

A second set of observations from Table A1 is that diversification away from livestock generally correlates with decreased wealth (as measured by per capita TLUs) and that engagement in wage labour and petty trade tends to increase among poorer herders. The most detailed data on pastoral wealth differentiation are provided for Orma (Ensminger, 1992), Rendille (O'Leary, 1985, 1990), Il Chamus (Little, 1992), Maasai (Bekure et al., 1991; Zaal, 1998), and Mukugodo (Herren, 1991). As Table A1 shows, each of these groups reveals increased patterns of income diversification as wealth status declines. Once again, the Maasai with their high per capita livestock holdings are an exception, but it is suspected that recent studies may not account for the numerous impoverished Maasai who work in local towns and cities or farm on the margins of Maasailand, which could partly explain why wealth holdings appear so high.⁹ Although the percentage of income from livestock is above 80 per cent for the wealthiest strata in most groups in Table A1, most 'poor' or 'very poor' depend on livestock for less than 50 per cent of their income. Among herders classified in the lower wealth groups, most depend heavily on wage labour, remittances (RM), beer brewing (BB), and 'other' (O) activities to survive.

To conclude, virtually no existing studies contain data on all of the variables in the model (Figure 2). Important groups in the region, like the Borana and the Samburu, have good information, but it is limited in scope and comparability. Indeed, most of the Samburu data on diversification strategies are presented in terms of frequencies rather than income amounts, and are disaggregated by generation or age set rather than wealth category (see Holtzman, 1996; Sperling, 1987; Straight, 1997). These limitations constrain comparisons with other studies. Moreover, with the exception of Coppock's (1994) work and a recent dissertation by Desta (1999), little is known about diversification in southern Ethiopia, one of the prime pastoral zones in all of East Africa. We know from qualitative data that the Boran of southern Ethiopia are focused more on pastoralism than their Kenyan counterparts, and that waged labour is relatively infrequent while trading

9. There may be fundamental disciplinary differences that could account for why measurements and diversification patterns may appear different in certain studies. Anthropologists, who often define pastoralism both as a form of livelihood and cultural identity, are likely to include in their analyses 'town' pastoralists and others who may only have a 'part-time' commitment to herding but still reside in their customary territories. An economist and economic geographer is more likely to define a pastoralist strictly in sectoral or occupational terms, and could miss some of these pastoralists who are moving between different occupations and sectors. Because the anthropologist often privileges the ethnic group as the unit of analysis, a poor Maasai or Rendille who has moved to a nearby settlement is still considered part of the culture, even with few or no livestock, and might be included in a calculation of wealth holdings and distributions.

is growing in importance (Desta, 1999; Diriba, 1995: 117) (see Table A1).¹⁰ Beyond that, however, little is known about patterns of income diversification in this area.

FIELD-BASED CASE STUDY

This section presents data from the study region based on one year of fieldwork by one of the co-authors (Smith) from March 1998 to March 1999. It provides further insights into the variables and relationships presented in the model (Figure 2) and Table A1. The information on income-earning activities was gathered through participant observation, unstructured interviews with key informants, and focus group interviews. Respondents were asked to list (in order of priority) the most important means of earning income, including both pastoral and non-pastoral activities (see Smith et al., 1999, and forthcoming). Visits to communities in the region lasted from one to several days, although three of the co-authors (Coppock, Little, and Smith) have spent long periods of time in the region prior to 1998. Because of their opportunistic and limited nature, the data in this section are meant to be illustrative rather than definitive of diversification patterns.

General Context

Interviews and field observations highlight several of the critical factors identified in the previous section that help to explain pastoral diversification in recent times. As noted earlier, various ‘push and pull’ factors drive diversification. What we learned from fieldwork confirms our earlier point that some people are pushed out of pastoralism because they no longer have enough animals upon which to survive. They are among the first to migrate to towns in search of food aid or ways to make money to support themselves. They may also be the first to embrace farming, a production strategy that takes far less time to get back on one’s feet than does pastoralism (Smith, 1997). All of these strategies in the region are directly related to climate (for farming) or to proximity to towns. Those who are pulled out of pastoralism, perhaps only partly, seek to expand their assets and income, securing food and reinvesting in animals in the process. People in this latter situation tend to be wealthier pastoralists who can afford to diversify into business activities that include shopkeeping or constructing and renting building space as a way to sell fewer animals.

10. In the early 1990s under the harsh Mengistu regime, Diriba (1995: 117) notes that ‘due to restrictive state policies affecting the rural labour market, rural households are not permitted to employ or to be employed even when it is desirable’. He goes on to say that off-farm employment in southern Ethiopia remains limited, even with a new government and less restrictive policies.

Table 1. Average Town Population and Number of Facilities to Buy and Sell Goods

Country	Population	Retail shops	Wholesale suppliers	Butcheries	Livestock market	Produce market
Ethiopia	5,312	92	4.81	2.25	0.75	0.38
Ethiopia ¹	3,933	26	0.20	1.87	0.73	0.33
Kenya	4,242	45	1.35	4.35	0.15	0.15

N=43 towns

Notes: (1) Excluding Negelle, Ethiopia.

Table 2. Average Number of Services and Facilities per Town by Country

Country	Primary Schools	Secon. Schools	Hospitals	Clinics	NGOs	Churches	Mosques
Ethiopia	1.25	0.19	0.25	1.25	0.69	1.88	0.88
Ethiopia ¹	1.13	0.13	0.20	1.00	0.47	1.67	0.80
Kenya	1.85	0.50	0.23	1.08	1.12	2.96	0.92

N=43 towns

Notes: (1) Excluding Negelle, Ethiopia.

Options to sell animals or to diversify out of the pastoral economy have much to do with the size and composition of towns, an important factor when comparing the differences in our study region between Ethiopian and Kenyan towns. Towns in Kenya offer more in the way of tradeable goods, public services, and education, than do those in southern Ethiopia. Recent figures show that Ethiopia's per capita gross national product (GNP) is about 60 per cent of Kenya's (Turner, 1998), which may partially account for the discrepancies in commercial activities and services in the region. Tables 1 and 2 divide town infrastructure by country, with the exception of Moyale town which lies on both sides of the border. Residents, both Kenyan and Ethiopian, on either side of the border can easily cross over to the other side for different activities. The Kenyan side has more schools, however, and is the only side with a livestock market.

One note of caution when interpreting Table 1: the inclusion of Negelle town skews the figures in favour of Ethiopia. There are reportedly 1,078 shops and 74 wholesalers in this Ethiopian town of 26,000 residents. The town in the region with the next closest number of shops and wholesalers, Marsabit, Kenya (population 13,500) has 390 shops and 10 wholesalers. With the exception of Moyale, Negelle is also the only Ethiopian town in our study area with public electricity, although it does not operate continuously. Marsabit, Marigat, Maralal, Isiolo, and Suguta Mar-Mar are all Kenyan towns in our study area that have 24-hour electricity when it is not punctuated by shortages.

Opportunities to buy goods or to sell livestock and agricultural produce (Table 1) appear to be greater in southern Ethiopia when Negelle is included in the calculations. As noted above, however, the inclusion of Negelle inflates the figures for Ethiopia. Table 1 shows that removing Negelle from the Ethiopian sample drops the average town population to 3,933 and the average number of shops and wholesalers to 26 and 0.2, respectively. In addition, more pastoralists in southern Ethiopia live further from towns than do pastoralists in northern Kenya, making trips to town and the utilization of services there less feasible.

The potential for receiving public and private services is greater on the Kenyan than on the Ethiopian side (Table 2). Religious organizations, namely the Catholic Church and Africa Inland Church (AIC), provide many of the public services — hospitals, clinics, and schools — in northern Kenya. Missionary activity is not as prevalent in Ethiopia, owing to the government's resistance to foreign influences and the Orthodox (Coptic) Church's dominance. The Ethiopian government has assumed almost all the responsibility for public services, with the Catholic Church and (Protestant) Mikena Yesus having a comparatively small presence. Table 2 indicates this disparity by showing opportunities for education to be greater in northern Kenya than in southern Ethiopia. This is especially true if Negelle is excluded, in which case the figures for primary and secondary schools drop to 1.13 and 0.13 per town, respectively, in Ethiopia.¹¹ Education can lead to income diversification, especially for those who believe they can or must support themselves outside the herder economy. Roth (1991) discovered that poor families who lived in the Rendille town of Korr, Kenya, sent more children to school because they had less need for their labour and because they wanted to maximize the chance that these children will obtain wage jobs in the future. Learning how to read and write also allows pastoralists to make more informed decisions about the money economy and other economic options.

Application of the Model

As money has become an ever-increasing part of daily rural life, examining the ways people generate income is important for understanding diversification. Money-making options, by frequency of mention and rank of importance, were elicited from a participatory rural appraisal (PRA) study of thirty-eight communities within our study area. Communities were selected

11. For ease of between-country comparison, junior secondary schools (classes 7 and 8) were lumped together with primary schools (classes 1–6) on the Ethiopian side. Kenya does not distinguish primary and junior secondary classes, instead putting classes 1–8 in the same school. Secondary school on both sides of the border consists of classes 9–12.

by one of the authors (Smith) and his field assistants, based on the criteria of differing proximity to towns, environment, economy, and wealth. While not random or exhaustive, the aim was to capture variation within the sample and to quickly assess the ways that pastoralists attempt to diversify their livelihood strategies. The findings help us to understand the complexity of diversification and the importance of the cash economy in the region.

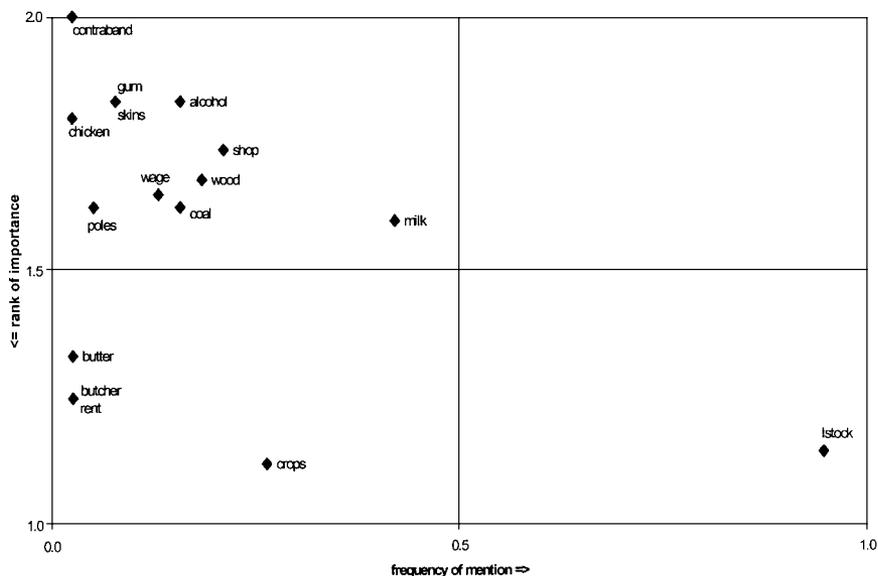
Scatter diagrams show both frequency of mention, in percentage terms, and rank of importance of the activities. Activities were ranked by an index method because different groups mentioned different numbers of activities. The most important activity was assigned a value of one, the least important two, and activities in between took on equally spaced integer values. The number of categories and their relative importance (rank) were left up to the groups of interviewees (see Smith et al. [1999] for discussion of a similar PRA study). The groups of informants listed a total of sixteen ways to make money: livestock (*lstock*), *crops*, *milk*, *rent* (building space), butchery (*butcher*), *butter*, *poles* (gathered for house construction), charcoal (*coal*), firewood (*wood*), wage jobs (*wage*), retail *shop*, *chicken*, *skins*, *gum arabic*, *alcohol*, and *contraband*. This last category consists of goods such as tea, soap, and plastic items that are informally bought on the Kenya side of Moyale and sold in Ethiopia. Those activities in the lower right quadrants are the most important, while those in the upper left are identified as the least significant.

As is to be expected in a pastoral region, livestock is the main income generator, the only variable in the lower right quadrant of Figure 3. Crops are second to livestock and are as important for making money for the communities that farm. When possible, it is better to sell crops because animals are the more valuable investment both socially and economically. Rarely mentioned as diversification options but extremely profitable are butcheries, rental activities, and butter sales. All other options appear less important, occupying the upper left quadrant of Figure 3. Milk is an important product, although it generates less income than crops because it is usually consumed (Fratkin and Smith, 1995; Little, 1994b; Smith, 1998). Charcoal and firewood generate little income and are labour intensive, while wage jobs in the study area are few and far between.

Opportunity Variables

As depicted in the model (Figure 2), variables that explain opportunities to diversify have to do with climate — or its proxies such as altitude or precipitation — education, availability of services and infrastructure, and distance from towns. Rural towns in the study region have experienced rapid growth in recent years, providing new opportunities for diversification out of the pastoral economy (see Tables 1 and 2). Poorer pastoralists, who previously attached themselves to wealthier relatives or neighbours until

Figure 3. Money-making Options by Frequency and Importance



their herds had been replenished, can now shift to towns and sell their labour or goods. For those who have enough animals on which to subsist, towns provide a demand for their milk products. Furthermore, business opportunities in the form of running shops, operating butcheries, or renting buildings can meet the demands of an expanding settled population.

Proximity to Town

Income options by proximity to nearest town reflect the various activities people can pursue based on demand for their products or services. Not surprisingly, the closer one lives to a town, the greater the number of options available. Persons living within a 39 km radius of towns mention up to eleven different income activities compared to seven activities for those who live more than 40 km away (that is, more than a day’s walk). The further one gets from market centres, the less important certain items become, especially those that are difficult to transport, spoil easily, or generate little income. Trend lines for milk and charcoal (*coal*) show decreasing frequency of mention and importance as distance to town increases (see Figure 4). Firewood (*wood*), crops, and wages are variables mentioned only by people who live less than 40 km from towns, and especially by those who live within 19 km (a roughly three hour walk) of towns.

study area (Little 1994a; Nathan et al., 1996), and this affects opportunities. Startup and maintenance costs of shops are too high for poorer households to engage in, as indicated by Figure 6 (discussed below) which shows only people from rich and middle-level strata owning shops. The fact that the upper left quadrant does not include renting out buildings reflects the high cost of construction. Only wealthier pastoralists, who usually live furthest from towns with their animals, can afford these costs.

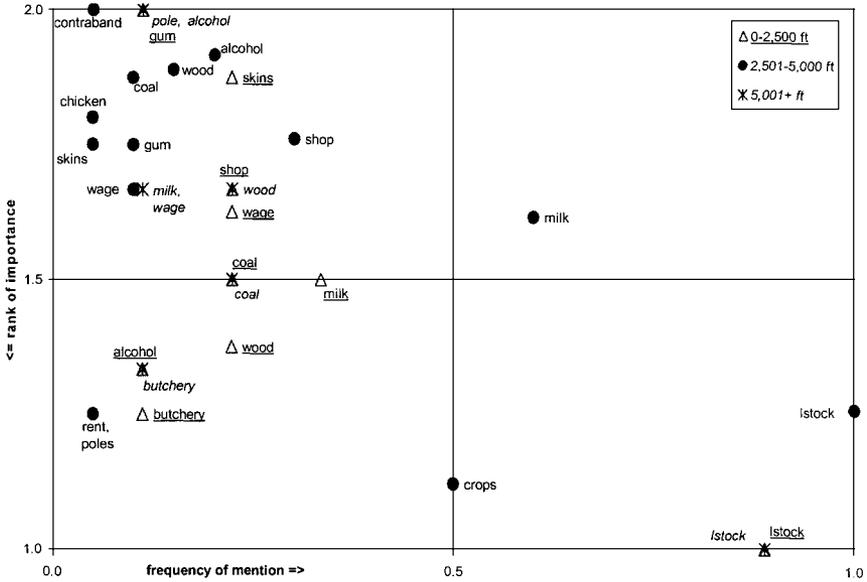
Climate

In the case study, altitude is used as a proxy for climate, since rainfall amounts in the study region generally correlate well with changes in elevation. Altitude is a convenient, albeit very general indicator that was measured using a handheld Geographic Position System (GPS) locator. We differentiated altitude zones in the region as follows: (a) 0–2500 ft asl; (b) 2501–5000 ft asl; and (c) 5001 plus ft asl. Money-making options that are correlated with altitude reflect the ability to farm and to pursue activities around towns of higher populations. The largest towns in our study area are located in higher elevations, where rainfall permits farming and sufficient water to support permanent settlement. Understandably, farming and selling crops is not a strategy pursued by those who live below 2500 ft, where desert and semi-desert conditions prevail (see Figure 5). It is interesting to note, however, that some communities situated above 5000 ft, where rainfall is adequate for agriculture, do not produce surplus crops to sell. Most of these sites are on the Borana Plateau, southern Ethiopia, where crop production is mainly for consumption. Additionally, wealthy outsiders or immigrant farmers have appropriated some of the rangelands that lie within areas of good potential for farming; they were not captured in the survey. For example, highland wheat farms around Maralal (5800 ft), Samburu District, and maize farms around Marsabit (4586 ft) are under the control of outside (non-pastoral) groups (see Figure 1).

It should be noted that income from agriculture (that is, crop sales) is generally important for herders of northern Kenya who reside in areas above 2500 ft (lower left quadrant of Figure 5). Not all of the people within our study area are near enough to towns to sell the crops they grow. Some Boran in Ethiopia, for instance, live too far from towns to sell crops, even though they now farm as a hedge against food insecurity. They prefer to grow maize that they would otherwise have to buy, thus allowing them to sell fewer animals for consumption needs. They readily admit, however, that farming is not reliable because of their general lack of farming knowledge and because of the typically erratic and insufficient rainfall on the Borana Plateau.

Some pastoralists still live near towns even though they have not diversified into agriculture. A case in point is pastoralists selling poles for

Figure 5. Money-making Options by Differences in Altitude



house construction and those who depend heavily on food aid. Although quite rare (see upper left quadrant of Figure 5), those who live around the highland Samburu town of Maralal, Kenya, can collect timber from the hillside forests to sell in town.

LOCAL RESPONSE VARIABLES

As noted earlier, how people respond to diversification options is related to wealth,¹² gender, and other social factors. For example, milk trading is an activity dominated by women. While not ranked very high, people identified from middle-wealth communities depend the most on milk sales, the only activity that occupies the upper right quadrant of Figure 6. Women from rich and poor communities sell milk less often. Among these two groups,

12. Wealth is a difficult variable to measure and is a highly relativistic term. In the focus group interviews, herders were asked to identify income-earning activities by their own classifications of wealth: poor, middle, and rich herders. No attempt was made to actually elicit a specific definition of what these wealth categories were equivalent to in livestock units. It should be noted that while we use the term 'rich', it means rich relative to other local herders and is not meant to be an absolute measure of wealth. Herders in the study region are among the poorest segments of society in both countries.

women from poor communities sell milk more often, although it is a less important income generator than are sales of crops, charcoal, or firewood. Poor women sell milk to buy more calories worth of food than they could otherwise obtain from drinking the milk (Fratkin and Smith, 1995: 447).

Wealth Differentiation

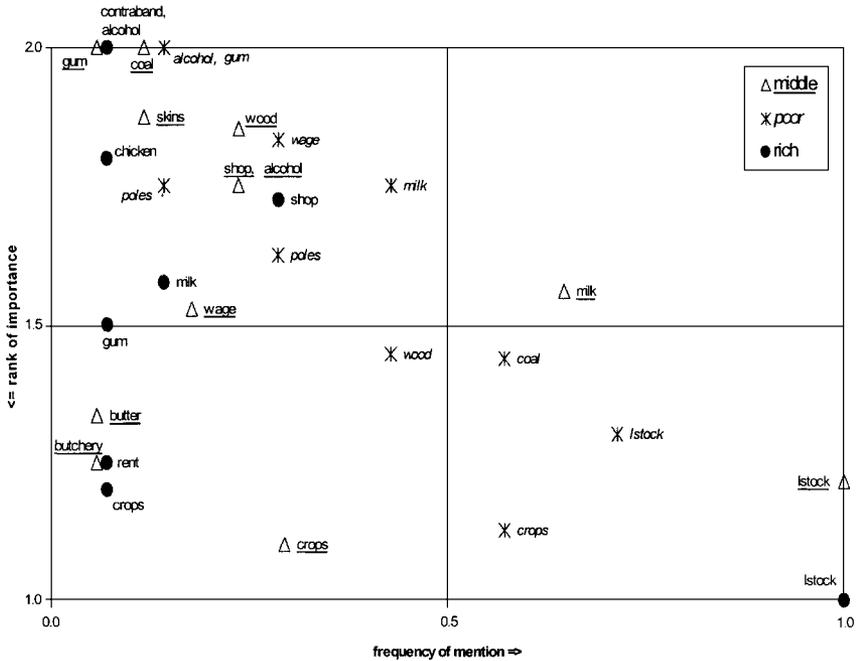
An investigation of money-making options among herders shows the importance of wealth (Figure 6). Members from poor and middle groups list ten activities, while members of rich communities list nine. However, the way in which these communities diversify varies. Only members identified as rich or middle-wealth groups indicated activities that have significant cash start-up costs. Renting buildings in town (*rent*), for instance, is an option only wealthy individuals can afford to pursue. Some of the wealthier Boran pastoralists around Negelle are doing this. Two Samburu visiting the Rendille area told one of the authors (Smith) that diversifying out of livestock and into buildings to operate as a shop, or to rent out, is more popular among Samburu, since they have been more exposed to ‘western’ influence. Owning a butchery is possible for individuals of at least middle wealth who live in small pastoral towns, as indicated in the lower left quadrant of Figure 6. Small retail shops, whether in towns or out of one’s home in the pastoral settlements, are also controlled by members of rich and middle-level strata. Members of poor groups cannot afford to operate shops, nor can they rent out buildings or start butcheries. These types of activities should decrease risk by adding to the pastoralist’s income and assets rather than replacing them.

Only members of poor classes discuss an activity other than livestock that registers in the lower right quadrant of Figure 6: selling charcoal (*coal*). No wealthy herders sell charcoal, while middle members rarely mention and always rank charcoal sales as generating the least income (upper left quadrant of Figure 6). As with charcoal, firewood (*wood*) is sold more often and is a more important income generator for poor pastoralists. Charcoal and firewood sales are income diversification activities done only out of necessity and are considered to be very low status activities. They are extremely laborious and generate little income, not always enough to buy food for the family. Despite the risk of being fined by the government because these are illegal activities, poor women have few alternatives to feed their families. The preferred cash generators of milk or produce sales are not available to them.

Gender

Gender plays a key role in the types of responses individuals may pursue. Selling animals is an activity well understood to be the domain of men in

Figure 6. Money-making Options by Wealth Category



the pastoral economy (Coppock, 1994; Fratkin, 1987; Holtzman, 1997; Kelly, 1990; Zaal and Dietz, 1998). By contrast, all income-earning activities in which women can engage are forms of diversification, including the previously mentioned milk sales. In addition to selling livestock, men diversify through selling poles, renting building space (*rent*), operating butcheries (*butcher*), and working for wages. Their continued preference not to diversify out of the livestock economy is revealed by how few of them engage in these other male activities, all of which occupy the left quadrants of Figures 3 to 6.

The difference in the gendered activities of selling livestock versus milk also becomes more pronounced as the distance to the market town increases. Men can sell animals regardless of how close they live to a market. In fact, they rely more heavily on livestock sales the further they live from markets, as their options to diversify decrease. But it becomes more difficult for women to sell milk the further they live from towns. In large part this stems from the nature of the commodities involved. Livestock can move on their own without the need to carry or otherwise transport them, whereas milk must be moved to market by some means of transport. In addition, milk is a perishable commodity and consequently must be shipped to market soon after milking in order to avoid spoilage. Because of these

constraints, women often turn to operating shops out of their homes or brewing alcohol.

Wealth and gender combine with proximity to town to determine women's opportunities. Despite the obvious advantage of being rich in livestock, women from wealthy families actually have fewer options to diversify because they tend to live further from towns. Figure 6 shows rich herd families selling milk less than middle or poor groups, both of which tend to reside closer to towns. Still, middle groups more frequently mention milk as an income generator than do poor community members, because middle-level women have more animals from which to obtain milk.

The extent to which women convert grains into alcoholic beverages is difficult to know. This activity can be profitable because of its high demand by (mostly) male customers. Women are hesitant to conduct this business, however, because it is illegal. Therefore, not surprisingly, selling local alcohol beverages is consistently mentioned little and ranked low, occupying the upper reaches of the upper left quadrant of Figures 3–6.

CONCLUSION: WHAT CAN WE SAY ABOUT PASTORAL DIVERSIFICATION?

The case study, as well as the review of the literature, shows that diversification strategies have multiple causes and patterns. The figures on how herders earn cash incomes show the relative importance of diversification, although pastoralism remains the primary activity. Dercon and Krishna's (1996) conclusion about the popularity of livestock as a productive investment appears to hold true throughout our study area. Although there are many alternatives to pastoralism, most tend to generate low incomes and thus may actually increase risk during periods of stress. Diversification is not a risk-averse strategy, especially for poor individuals, because they do not necessarily diversify into several different sources, nor do they do so out of choice. Rather, they replace pastoral activities with other activities in order to survive regardless of the medium- to long-term consequences. Wealth again enters the picture because middle-wealth and rich families can and do diversify to minimize risk, being as aware as poorer families are that specialized pastoralism no longer takes care of all their needs. For the relatively rich, holding all of their assets in livestock invites losses — costs that appear to be increasing in frequency and severity on East Africa's rangelands (Desta, 1999).

As noted earlier, the goal of this article was not to carry out rigorous statistical analyses to determine the ultimate causes of diversification. The data to do so are simply unavailable at this point. We have shown, however, that there are important trends in the region that can be observed from existing studies and from the case study. For example, there is little question that across the study region (and generally throughout pastoral areas of

East Africa) per capita livestock holdings have declined considerably since 1980 (see Table A1). In these areas there is now a substantial population of stockless or near-stockless herders who often reside near towns. We would venture to say that currently very few groups in the region (especially after the devastating drought of 1999–2000), have average per capita holdings of more than 4 TLU per person, a figure considered to be about the threshold for pastoral self-sufficiency — and most groups own less than 2 or 3 TLU per person. For example, data for the Ariaal of Marsabit, Kenya, show a decline in per capita holdings from 8.2 TLU in 1976 to 4.0 TLU in 1995 (Nathan et al., 1996). The Il Chamus have also seen a reduction in per capita livestock holdings of about 40 per cent over the 1978–90 period (Little, 1992).

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 much of this has occurred since the 1970s, and how rapidly it has happened. For areas where agriculture is feasible, there continues to be an expansion of agriculture into former range areas, including dry-season grazing reserves. These include areas on the Borana Plateau, southern Ethiopia; around irrigated perimeters in Baringo, Kenya; on Marsabit Mountain in northern Kenya; and on the Leroghi Plateau, Samburu District, Kenya. Much of the expansion has been carried out by herders themselves, or by non-pastoralists who have encroached on rangelands. For areas where agriculture is not feasible, diversification has mainly entailed wage labour 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.

Our discussion also shows that not only has diversification among herders increased since 1980 but that different categories of herders — rich/poor and male/female — have responded differently. For the poorest herders unskilled waged labour 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 labour. The process of diversification affects the richest and poorest herders, leaving ‘middle’ wealth herders relatively out of the pattern. This bifurcated pattern of pastoral divestment was first observed by Fredrik Barth (1964) more than thirty years ago and still holds true today.

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 (see Coppock, 1994; Fratkin and Smith, 1995; Little, 1992). Wealthier women herders are likely to rely more on income from livestock and milk and ghee sales, rather than on other revenue sources. Shop ownership, retail business, and labour 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 labour than in drier rangelands. Little (1992), for example, describes how herders who had partially diversified into irrigated agriculture rebuilt their herds more quickly after the droughts of 1979–80 and 1984 than did others. Hogg (1980) also shows how the Boran of Isiolo, Kenya, who have diversified into agriculture and trading, withstand bust years better than others. The extent to which cultivation allows the Boran of southern Ethiopia to better manage risk is currently being addressed by the Pastoral Risk Management (PARIMA) Project, an interdisciplinary applied research programme in the region (see footnote 2).

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 labour for herding and reduce herder mobility — an occurrence that can have negative social, economic, and ecological impacts. Indeed, recent research has shown that for middle to wealthy herders, mobility remains the key pastoral risk management strategy, and those pastoralists who migrate their herds have considerably fewer livestock losses during climatic disasters than their sedentary counterparts (Little, forthcoming; Niamir-Fuller, 1999). The studies from Marsabit District, Kenya, also show the potentially negative ecological and social effects of pastoral sedentarization and diversification (Fratkin, 1991; Nathan et al., 1996). Yet most studies have not paid sufficient attention to differences in non-pastoral income activities and what these mean for the herder, the environment, and the production system. Nor have they acknowledged that certain diversification strategies do not always lead to sedentarization. Indeed, a herder family with members engaged in a lucrative trading activity or waged job can help the family maintain a pastoral livelihood through remittances, as well as provide capital to rebuild herds after a disaster.

To conclude, we have attempted to examine comparatively the issue of income diversification among herders in northern Kenya and southern Ethiopia. This has highlighted the complexity of a topic that is made even more difficult by inconsistent use of terms and measurements and by disciplinary biases. Additional research is needed to identify the ways in which gender intersects with diversification, and the effects of spatial variables (for example, proximity to towns) and rangeland availability on pastoral diversification. The model and the case study presented here are suggestive of the kinds of data that need to be gathered to understand patterns of pastoral diversification. Yet, until there is recognition of the differences in what we have termed ‘conditional’, ‘opportunity’, and ‘local response’ variables, analyses of one of the most important processes in the rangelands of East Africa will remain highly localized and under-theorized.

Acknowledgements

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Appendix Table A1. Comparative Analysis of Pastoral Diversification¹

Ethnic Group	Sources of income ²	Data by wealth category (in % terms)	Data by gender	External income flows (e.g., food aid)	Avg. annual rainfall	Pop. density ³ per km ²	Livestock per capita ⁴	Date of data
Ariaal	% of pastoral HHs with wage workers: 1976 10% of HHs and 0.13 members employed per HH; 1985 19% of HHs and 0.25 members employed per HH.	ND	ND	Food aid programmes in 1970s and 1980s.	500mm	1.2	1976: 8.2 TLU/ person 1995: 4.0 TLU/ person	1974–75, 1985, 1995
Boran/ Ethiopia	LS > 95% of total income (90% of income cattle related); Ag involvement 33% to 88% of families during 1980s.	ND	ND	Food aid present in some years.	700mm	7.3	2.3 TLU/ person	1980–1989
Boran/ Kenya	Some received cash from farming.	ND	17% males (M) involved in wage labour.	Food aid programmes present.	305mm	1	ND	1979
Orma (Borana related), Kenya	1980: LS 74.8%, WL 18.6%, T 6.5% 1987: LS 51.3%, WL 33.2%, T 15.4%	<i>Poor:</i> 1980: LS 61.9%, WL 33.2%, T 4.8%; 1987: LS 42.1%, WL 52.3%, T 5.5%. <i>Middle:</i> 1980: LS 77.0%, WL 16.7%, T 6.3%; 1987: LS 49.0%, WL 32.7%, T 18.2% <i>Rich:</i> 1980: LS 84.9%, WL 6.8%, T 8.4%; 1987: LS 62.9%, WL 14.8%, T 22.4%	ND	Government famine relief in some years.	450– 650mm	Est. 2	1980: 5.0 TLU/ person; 1987: 3.5 TLU/ person	1978–81, 1987

Appendix Table A1 (contd)

Ethnic Group	Sources of income ²	Data by wealth category (in % terms)	Data by gender	External income flows (e.g., food aid)	Avg. annual rainfall	Pop. density ³ per km ²	Livestock per capita ⁴	Date of data
II Chamus	LS 65.2%, Ag 0.8%, Pk 2.6%, Fi 2.8%, NF 28.6%.	<i>Richest:</i> LS 85.5%, Ag 4.0%, NF 10.5% <i>Rich:</i> LS 30.9%, Ag 2.8%, NF 66.3% <i>Middle:</i> LS 44.2–64.2%, Ag 3.3–10.8%, Pk 0.0–10.9%, Fi 1.9–7.1%, NF 23.2–34.4% <i>Poor–Poorest:</i> LS 47.3–59.5%, Ag 1.9–10.5%, Fi 1.8–11.7%, NF 30.5–40.7%	ND	Food aid programme present.	640mm	14	3.36 TLU/person	1980–81
Gabbara	LS 80.2%, RM 7.9%, G 4.9%, O 5.0%, H 2.0%	ND	ND	Food aid programme present since 1971.	< 300mm	Est. 1–2	8.9 TLU/person	1981–1984
Maasai (1977)	'Pastoralists': LS 93.4%, G 1.3%, B 2.4%, WL 1.4%, O 1.5% 'Maasai Farmers': LS 35.4%, Ag 9.9%, ES 1.3%, RS 6.5%, WL 8.0%, R 4.1%, B 34.9%	ND	ND	Famine relief received by 41% Maasai farmers, 67% Maasai pastoralists	794mm	Est. 6 but considerable local variation	ND	1977

Maasai (1981–1983)⁵	LS 67.2–87.2%, WL 0.8–12.4%, MT 7.4–19.4%, BB 0.0–1.9%, O 0.0–1.4%	<i>Poor:</i> LS 71.9%, WL 8.9%, MT 13.9%, BB 2.3%, O 3.0% <i>Medium:</i> LS 80.6%, WL 11.8%, MT 7.0%, BB 0.5%, O 0.0% <i>Rich:</i> LS 88.6%, WL 8.4%, MT 2.6%, BB 0.2%, O 0.2%	ND	Not present	463– 584mm	6	Est. 4.4 TLU/ person	1981–83
Maasai (1994–1995)	LS 83 %; O 17%	<i>Poor:</i> LS 91%, O 9% <i>Middle:</i> LS 90% , O 10% <i>Wealthy:</i> LS 85%, 15%	Males: LS 85–92%, O 8–15% Females: LS 79–92%, O 8–21%	ND	463– 584mm	Est. 8	8.1 TLU/ person ⁶	1994–1995
Mukogodo Kenya	LS 58%, RM 31%, O 11%	<i>V Poor:</i> LS 63%, RM 22%, O 15% <i>Poor:</i> LS 31%, RM 60%, O 9% <i>Medium:</i> LS 59%, RM 31%, O 10% <i>Rich:</i> LS 96%, RM 1%, O 3%	ND	Food aid present	Est. 500– 600 mm	31	Est. 1.8 TLU/ person	1987–88
Rendille (1981–1984)	LS 77.8%, NP 22.2%	<i>Poor:</i> LS 77.8%, RM 13.4%, G 8.9% <i>Better-Off:</i> LS 80.5%, RM 11.9%, G 7.6%	ND	Food aid programme present since 1971.	167- 800mm	Est. 1	Est. 11 TLU/ person	1981–1984
Rendille (1976, 1989, 1995)	1976 0.0 HH members in WL; 1989 0.37 HH members in WL. Increased settlement in towns, and WL and T. In 1995, 34.9–40.5% of HHs had someone in WL; 36.5% of HHs sold milk, 16.2% of HHs sold crops.	ND	ND	Food aid programmes present.	500mm	1.2	1.9 TLU/ person (1995)	1976, 1989, 1995

Appendix Table A1 (contd)

Ethnic Group	Sources of income ²	Data by wealth category (in % terms)	Data by gender	External income flows (e.g., food aid)	Avg. annual rainfall	Pop. density ³ per km ²	Livestock per capita ⁴	Date of data
Samburu (highland) (1981–82)	Ag began in late 1970s, 1981: 13% at Ilkilorili in Ag; 91% at Baawa in Ag; 100% at Lorian in Ag; some migration for WL.	ND	ND	ND	500–700mm	Est. 10 (Leroghi Plateau)	3.25 TLU/person ⁶	1981–82
Samburu (lowland) (1983–84)	Increasing involvement in WL, esp. since droughts of 1980 and 1984.	ND	Increasing WL experience among males over time.	Food aid programme present.	250–500mm	Est. 4	1.7 TLU/person ⁷	1983–84
Samburu (highland) (1992–1994)	42.6% of households in BB, 15.8% in Ag, and 42.8% in WL	Richest 25.0% of herders in WL; 'well off' 28.6% in WL, average 35.3% in WL, stock poor 35.5% in WL, stockless 46.9% in WL.	36.6% of males in WL; 64.8% of males at some time in WL. Women work locally (no data).	ND	Highland 500–900mm	ND	ND	1992–1994
Samburu (lowland) (1992–1994)	Widespread WL	ND	> 40% of young men involved in WL. Mainly young men travel for jobs.	Food-for-work (food aid) programme; 51% of women in programme.	400 mm in lowland	ND	Est. 2 TLU/person	1992–1994

Tugen (1987– 1988)	LS 60.0%, Ag 7.4%, WL 5.3%, NF 27.3%	<i>Poor</i> : LS 55%, Ag 24%, NF 21% <i>Medium</i> : LS 59%, Ag 18%, NF 24% <i>Richer</i> : LS 29%, Ag 7%, NF 64%	ND	Food aid present	940mm	Range from 23 to 41.	1.4 TLU/ person ⁸	1987–1988
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Notes:

1. Data for this table are based on Ariaal (Fratkin 1991; Fratkin and Roth 1990; Fratkin et al. 1996); Borana/Ethiopia (Coppock, 1994), Borana/Kenya (Hogg, 1981); Orma (Ensminger, 1992); Il Chamus (Little, 1992); Gabbra (O'Leary, 1985, 1990); Maasai 1977 (Campbell, 1978); Maasai 1981–1983 (Bekure et al., 1991); Maasai 1994–1995 (Zaal, 1998; Zaal and Dietz, 1999); Mukugodo Kenya (Herren, 1991); Rendille 1981–1984 (O'Leary, 1985, 1990); Rendille 1976, 1989, 1995 (Fratkin, 1991; Fratkin et al., 1996; Roth, personal communication); Samburu-highland 1981–82 (Perlov, 1987); Samburu-lowland 1983–84 (Sperling 1987, 1989); Samburu-highland 1992–1994 (Holtzman, 1996); Samburu-lowland 1992–1994 (Straight, 1997; GFA 1993); Tugen 1987–1988 (Vedeld, 1990; Vedeld and Lusenaka, 1991); and Kenya 1994 (some population density figures, see note 3).
2. The codes used for income activities are as follows:
(HH) household; (LS) livestock; (G) gifts; (WL) wage labour; (T) trade; (Fi) fishing; (ES) egg sales; (H) handicrafts; (Ag) agriculture; (NF) non-farm; (Pk) Pekerra Irrigation Scheme (government irrigation scheme, Baringo, Kenya); (RM) remittances; (MT) money transactions; (RS) retail shop; (R) rental; (BB) beer brewing; (NP) non-pastoral; (B) business; and (O) other. ND implies that data were unavailable or insufficient to include in the table. The authors take full responsibility for any misinterpretations and oversights to data that are included in the table.
3. If population density figures were not provided in the cited text, figures listed are for the district and are drawn from the 1989 Population Census of Kenya (1994).
4. A TLU is equivalent to 250 kg of liveweight animal. The approximate animal ratios are 1 TLU = 1 cattle, 0.8 camels, or 8 small stock (goats and sheep).
5. Based on three Maasai areas: Olkarkar, Merusihi, Mbirikani — each with different income emphases — and the work of Bekure et al. (1991).
6. This TLU figure also includes donkeys, so it is slightly overstated relative to ownership figures for other groups. Zaal's (1998) household data are based on three Maasai group ranches, but these data only cover the Olkarkar group ranch area. In this study 'other' income includes waged and self employment, shop ownership, sale of crops, etc.
7. This figure only includes cattle and, therefore, it is probably an underestimate.
8. This figure only includes those individuals who owned livestock. Based on Little's work (1992) in Baringo at least 20 per cent of Tugen have little or no livestock, which would considerably reduce the TLU figure in the table.

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