Chapter 5

Cursed If You Do, Cursed If You Don't

The Contradictory Processes of Pastoral Sedentarization in Northern Kenya

JOHN MCPEAK AND PETER D. LITTLE

1. INTRODUCTION

The increased sedentarization of pastoral populations has characterized most arid and semi-arid regions of the world during the past two millennia. The origins of many towns in the Middle East, North Africa, and the Sudan stem in part from the historical process of pastoral sedentarization, whereby segments of mobile herders sought refuge or economic opportunity from settled life. The accelerated settlement of herder populations in Sub-Saharan Africa during the past century provoked claims of 'an end to pastoralism' as diversification into town-based activities was seen as a departure from pastoralism, rather than a supplement or support to it (Government of Kenya, 1980; Snow and Morris, 1984). Northern Kenya is unique in this respect since most settlements and towns have only arisen in the past 50 or so years, and mobile pastoralism still characterizes large parts of the region. The increased sedentarization in the area also reflects a series of external influences, such as the widespread proliferation of food aid and other forms of development assistance, which complicates an understanding of longer-term trends toward settlement. It also questions whether or not increased sedentarization among herders in the region really reflects an enduring commitment away from pastoralism.

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This chapter presents some preliminary results from a three-year research effort examining pastoral risk management in northern Kenya and southern Ethiopia. The materials here are only from the Kenyan research sites and are supplemented by the authors' earlier studies in the area: McPeak studied the Gabra of Marsabit District during 1997–1998 and Little the Chamus of Baringo District, 1980–1998. One main finding of the current study is that what is often called 'sedentarization' does not necessarily reflect a full-time departure from pastoralism, nor does it always jeopardize pastoral production. When one explores intra-family and intra-household dynamics, a changing pattern of diverse combinations of sedentary-like occupations and pastoral activities are revealed. We find that sedentarization does not imply a lack of access to livestock, nor always a lack of mobility for livestock owned by settled households. In addition, we identify a great deal of diversification into non-pastoral activities in areas where households remain involved in pastoral production, even while members are engaged in waged labor and other sedentary activities. The historical process of declining per capita livestock holdings noted by other studies (Fratkin, 1991; Little et al., 2001) has led households to respond by having certain family members leave the system to allow remaining members to pursue herding. Those who depart from the pastoral sector can enter economic niches that generate resources for the pastoral economy through remittances and other transfers. Even agriculture can support pastoralism by generating grains that reduce a family's need to sell off livestock to finance cereal purchases, a pattern that becomes very important in post-drought periods when livestock holdings are reduced (Little, 1983, 1992).

While this appears to be an important trend revealed in our data, our findings provide important counter-examples to this general pattern. In some cases we observe impoverished households that leave the system cluster around towns and earn incomes insufficient to transfer back to the pastoral sector. It is this later vulnerable group that has attracted much of the attention of scholars and development practitioners, as well as those who claim an imminent end to pastoralism. We also find households which fared relatively well in one of our more arid sites (Kargi) where highly mobile pastoral production was practiced during the most recent drought. In contrast, for one of our most sedentary sites (Dirib Gumbo), we find diversification into agriculture and investment in education did not provide households with many benefits during the drought period. Finally, we suggest that the relationship between sedentarization and vulnerability in livestock wealth and sedentarization and vulnerability in food security need to be carefully distinguished. It is clear in our data that sedentarization does make households more vulnerable to livestock losses in a drought, but that the relationship between food security and sedentarization varies between our sites in complicated ways that we will elaborate later in the chapter.

2. BACKGROUND TO RESEARCH REGION AND DESCRIPTION OF THE STUDY SITES

The chapter draws on research conducted by the Pastoral Risk Management Project (PARIMA) of the Global Livestock Collaborative Research Support Program.[1] The study area covers approximately 10,000 square km 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 Boran, Gabra, and Guji of Ethiopia, and Ariaal, Boran, Il Chamus, Gabra, Rendille, Samburu, and Tugen peoples of Kenya.

The data presented in this study draw on six northern Kenya study sites, where 30 households were randomly selected in each site. Four sites are in Marsabit district, one is in Samburu district, and one is in Baringo district. Sites were chosen to represent diversity in ethnicity, mean rainfall, and market access as described in Table 1 and elaborated upon below. The sites are noted on the map in Figure 1.[2]

A unique aspect of the study is that we used an areal sampling framework based on the Kenyan administrative unit, the Location. This means that our sampling methodology did not distinguish between pastoral and sedentary households. Thus, the study includes households and individuals residing in or near towns, as well as mobile pastoral households residing away from towns. Because the sample was randomly selected within each of the

Table 1. Sites Where Data were Gathered.

Site	District	Predominant ethnic group	Average annual rainfall	Market access
Dirib Gumbo	Marsabit	Boran	650	Medium
Ngambo	Baringo	Il Chamus	650	High
Sugata Marmar	Samburu	Samburu	500	High
Logologo	Marsabit	Ariaal	250	Medium
Kargi	Marsabit	Rendille	200	Low
North Horr	Marsabit	Gabra	150	Low

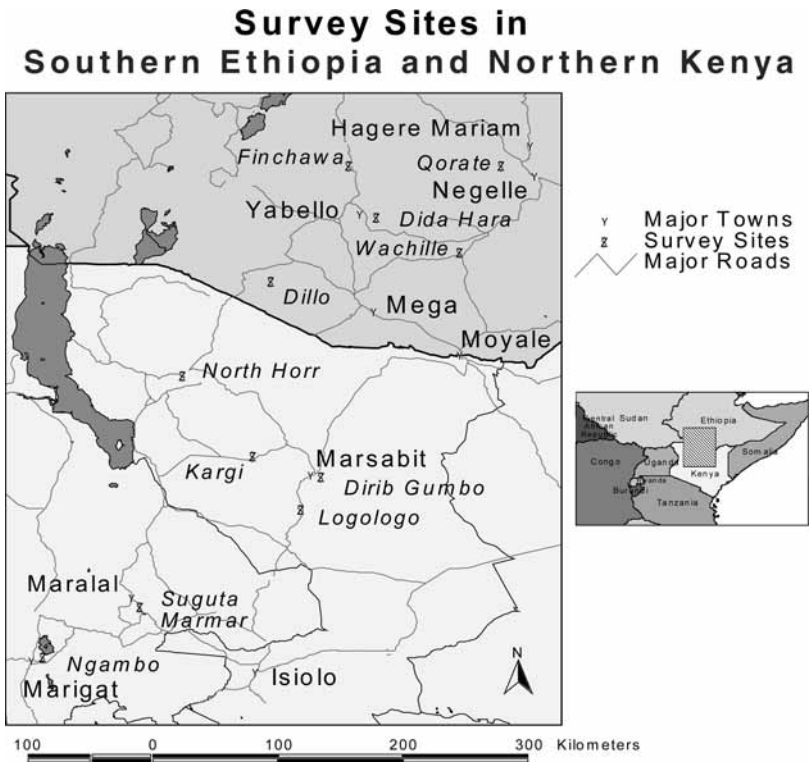

Figure 1. Pastoral risk management project study area.

six locations, the degree of sedentarization reflected in the sample can be taken to be representative of the degree of sedentarization of the location level population.

Households were interviewed with a baseline survey in March 2000 and were re-interviewed at three-month intervals following this baseline. The data presented in this chapter draws on the baseline and the first six repeated surveys, covering the period March 2000 to September 2001; and on a series of qualitative, structured interviews conducted during July to October 2001. Table 1 summarizes the study sites, and is followed by brief descriptions of the six sites ordered from highest rainfall to lowest rainfall.[3]

Dirib Gumbo is a Boran settlement approximately 10 km from Marsabit town.[4] The majority of the market activity undertaken by Dirib Gumbo residents takes place in Marsabit town. Most the residents of this area reside on the upper slopes of Marsabit Mountain, and practice rain fed cultivation. Many households in this area also keep livestock. In some cases these animals are used to plow fields. Very little large-scale migration of animals takes place from this location, both due to relatively small herd sizes and because nearby pastures are controlled by other ethnic groups. Herders instead rely on crop residues, forest products, or pasture on the lower slopes of Marsabit Mountain to feed their animals.

Ngambo is an Il Chamus settlement approximately 10 km east of Marigat town (see Little 1992). Marigat town is located 100 km north of Nakuru on an all-weather road. Marigat town is the major market center used by Ngambo residents. Marigat is particularly lively during the twice-monthly livestock auction held just outside town. Ngambo is located near the Pekerra irrigation scheme, and a large number of households of this location either grow crops in this scheme themselves or work as laborers in these fields. Their form of pastoralism is markedly sedentary, but does entail seasonal herd movements of 20–30 km, during the dry season. The majority of family members rarely move during the year.

Sugata Marmar is a Samburu settlement on the Laikipia–Samburu District border, approximately 50 km south of Maralal on the Maralal–Rumuruti road. Significant populations of impoverished Turkana and Pokot are resident in this location as well. Sugata Marmar has a large weekly livestock market offering households the opportunity for alternative income sources and a place to sell animals. Some rain-fed cultivation is practiced in this area, particularly in the higher elevation areas towards Maralal town, the administrative center of Samburu District. Pastoralism in the area is moderately mobile and cattle can be moved distances of 50+ km during harsh dry seasons or droughts. Rather than the whole family moving with the herds, households mainly rely on a combination of satellite camps of young men (16 years and older) to care for and migrate with the animals and, for polygamous households, moving animals between households of different wives that are established in different areas. From interviews it seems that families themselves used to migrate with the herds more frequently before the 1980s.

Logologo is an Ariaal settlement approximately 40 km south of Marsabit town on the main Isiolo–Marsabit road. Ariaal are a group that mixes elements of Samburu and Rendille culture (see Fratkin, 1991). Logologo residents utilize markets in both Marsabit town and in Logologo town. Rain-fed agriculture is possible in the higher areas of this location, and a very small amount of small-scale irrigation is practiced in town. Most households in Logologo settled there in the 1970s following a series of poor rainfall years and herd losses. Like the Samburu mentioned above, they no longer move the whole family with their animals. Instead, they keep small herds in the area around town and send the majority of their animals to satellite camps in the surrounding rangelands.

Kargi is a Rendille settlement approximately 75 km to the west of Marsabit town in a flat, arid basin. Kargi residents mostly conduct market activity in Kargi town, although they make occasional use of Marsabit markets. No cultivation is practiced in this area. Over the past 20 years, formerly nomadic Rendille have settled around the town center in clan groupings. Rendille in the Kargi area keep small herds in the area around town and rely on young men to stay with the remainder of the herd in highly mobile satellite camps. They keep relatively large numbers of camels and goats and it is not unusual for their camps to move several times during a season.

North Horr is a Gabra settlement approximately 200 km west of Marsabit town on the northern edge of the Chabi desert. Similar to Kargi, most market activity takes place in North Horr town, although residents do make occasional marketing trips to Marsabit town. No cultivation is practiced here. Many Gabra are nomadic in the traditional sense, as households move their house and household belongings to new areas with their animals with some frequency. However, the time between these moves is becoming longer and the area covered by these moves is becoming smaller as Gabra slowly appear to be moving toward the satellite camp based system of their Rendille neighbors. Gabra also keep relatively large numbers of camels and goats in their herds.

3. PRELIMINARY SURVEY FINDINGS

In this section, we present some of our preliminary findings based on cross-community comparisons. At the time this chapter was prepared, we were still involved in the data gathering process. Because of this, we have not yet prepared the data for analysis at the individual and household levels. However, it is possible to analyze the data set in its current form at the community level, but even in this case the findings should be treated as preliminary. Therefore, we advance these findings as broad cross community comparisons that will be refined by further analysis at the household and individual levels when data gathering is complete.

3.1. Herd Size Change, Mobility, and Sedentarization

The period covered by the survey began with a generalized drought in northern Kenya. Figure 2 presents information on rainfall in our study sites. The main impact of the drought was felt throughout the study area in 2000. Overall, sample households lost an average of around 25% of their herds between March 2000 and March 2001. The overall rate of stockless households in our sample increased from 7% in March 2000 to 12% in September 2001.

Survey results indicate there are large differences in herd size between sites and in the losses experienced. With regard to herd size, these differences generally follow the pattern that larger household herds are located in the study region's drier areas, such as North Horr and Kargi. The listing of sites from largest median herd to smallest median herd when all households and time period specific observations are included is as follows (Total Livestock Unit values in parentheses[5]): Kargi (21), North Horr (20), Logologo (9), Dirib Gumbo (6), Sugata Marmar (4), and Ngambo (2).[6] However, as seen in Figure 3, there are major differences between locations in the pattern of herd size change over the survey period.

Figure 3 indicates that there are differences in the severity of herd losses when the different areas are compared. We propose that part of the explanation for these differences

is found in the degree of livestock mobility. Increased mobility has a relationship with decreased herd loss. This is revealed by the information presented in Table 2. Table 2 presents for each site the overall change in herd size between March 2000 and September 2001, the maximum decline during this time period, the average number of water points used by a household having herds per period, the percent of these points that were described as satellite camps, and the total number of water points used by households in

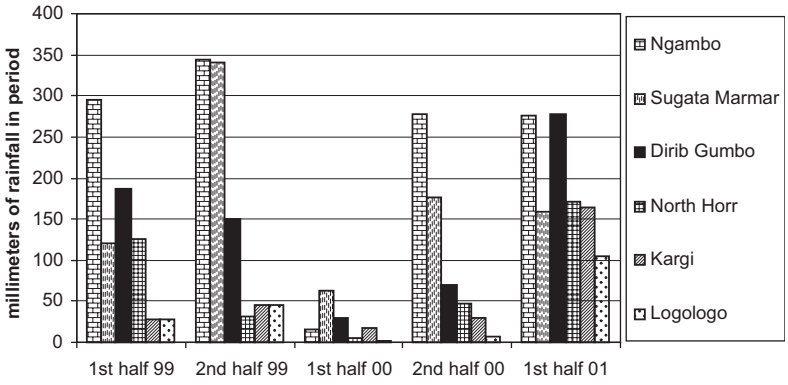

Figure 2. Rainfall in the study sites.

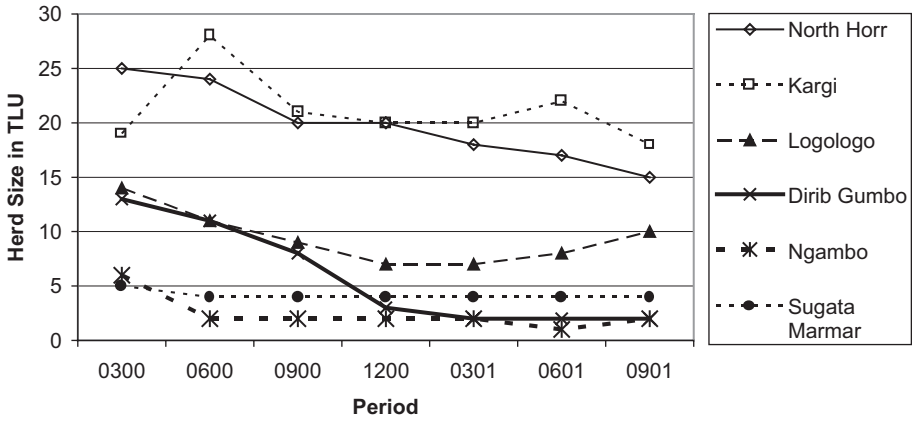

Figure 3. Median herd size by season, March 2000 to September 2001.

Table 2. Herd Size Change and Mobility.

	% Decline 0300 to 0901	Maximum % decline	Average H_2O points used	% Satellite camps	Total H_2O points named
Dirib Gumbo	−85%	−85%	1.1	46%	10
Ngambo	−67%	−83%	1.5	1%	18
North Horr	−40%	−40%	1.7	45%	56
Logologo	−29%	−50%	2.0	81%	54
Sugata Marmar	−20%	−20%	1.3	28%	60
Kargi	−5%	−5%	3.3	88%	40

each location over the March 2000 to September 2001 period. Mobility is measured by the number of water points and reliance on satellite camps by the different communities.

With the exception of Sugata Marmar, the table indicates that higher levels of mobility are associated with lower herd losses. In most sites, the higher the average number of water points used per period, the lower the average herd size decrease. This is also true for satellite camp use. Findings from Sugata Marmar suggest that having many water points to visit may also make a difference. Herders in Sugata mentioned more points than any other area, suggesting they are able to spread out over more area. Households use relatively fewer points per period than in other areas, but use more water points overall than in other areas.

When we turn to the issue of herd size change within areas, the data suggest that herd accumulation is an effective strategy for ensuring a viable post-drought herd size. Figure 4 presents (natural log transformed) herd size in March 2000 compared to (natural log transformed) herd size in March 2001 at the household level. A 45-degree line is added to this graph. In this graph, a dot above the line indicates a household herd increased in size over the period, a dot on the line means the beginning and ending herd were the same size, and a dot below the line means the household herd decreased in size over the study period.

The cloud of dots slightly below the 45-degree line reflects the decreases in average herd size reported in figure one. However, note the pattern of the dots is generally upward sloping. Households that had more animals in early 2000 tend to be the households that have more animals in 2001. The relationship is not perfect, but it does help to explain why herders attempt to maximize herd size in good (pre-drought) years—an attribute that many 'experts' associate with pastoral irrationality. Some households did better than others, and actually realized increased herd size over the one-year interval. Others did much worse. The most extreme examples are found for the households represented by the dots along the lower axis. These dots indicate that households with herds of up to 25 TLU in March 2000 had become stockless only a year later.[7]

While it is early in the herd rebuilding process, our preliminary results indicate herd rebuilding is more a matter of the biological process of animal birth within the family herd

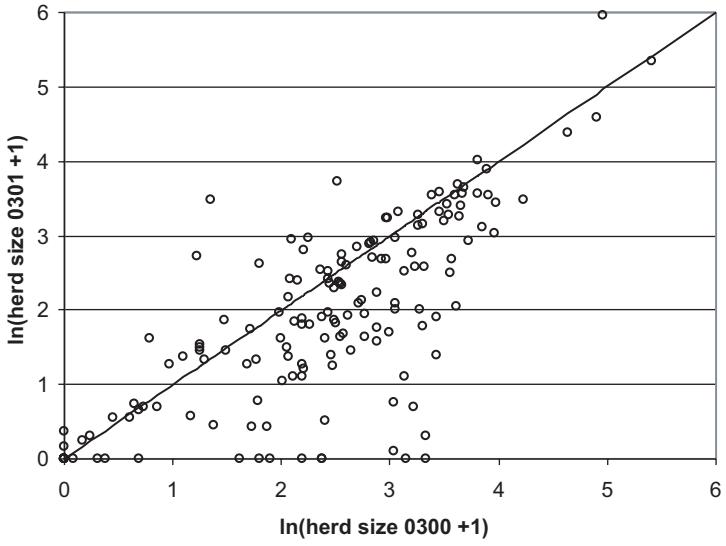

Figure 4. Herd size in March 2000 compared to March 2001.

than restocking through transfers from other herders or restocking through use of the market. From March 2001 through September 2001, the average birth rate from the total herd in TLU terms was an annualized 28 percent, compared to purchases in the markets and receipts of livestock gifts and loans, which account for an annualized rate of 3 percent, respectively. In short, if a herder was more mobile and had a larger herd s/he generally fared better during and immediately after a drought than others.

The following three case studies of individuals illustrate the kinds of strategies that herders invoke to cope with and recover from drought.[8]

Case A. William is an Il Chamus from Ngambo who is in his mid-30s and is relatively well-educated with two years of secondary school training. He lost about 75 percent of cattle during the 1999/2000 drought and is attempting to rebuild his herd through several different mechanisms. First, he is relying on small stock, which reproduce faster than cattle. He even recently bought additional goats from the sale of a young bull that survived the drought. Second, he is pursuing agriculture both to produce surplus grain which he can sell locally to buy livestock, and to have sufficient food so that he does not have to sell animals to buy grain. This latter strategy is cited by a number of herders in our study region, but only where cultivation is feasible. Finally, William is rebuilding his herds through the use of remittances from family members working outside Ngambo and from customary livestock gifts and exchanges. In comparing his current herd rebuilding strategies with those following the equally devastating 1991–1992 disaster, he complains that local livestock gifts and transfers were more common in 1992 than now, because widespread poverty has diminished the capacity to help family members and friends. "A destitute person cannot help other destitute persons," he explains. According to William, it took about two years to rebuild his livestock after the 1991–1992 drought, but he thinks it will take longer now.

Case B. Lenapir is an Ariaal Rendille from Logologo, living about 40 km south of Marsabit town. She heads her own household and is engaged in farming and some petty trade around Logologo town. She is a widow with six children. A lion killed her husband in 1992. During the 1999–2000 drought she lost 75 percent of her animals and is now a fairly destitute pastoralist. Her most important strategies for herd recovery are assistance from her brothers (one of whom is relatively wealthy), receiving food aid so that she can meet subsistence needs without having to sell animals, and natural reproduction of her remaining herd. She was expecting that some of her cattle would give birth in late 2001, helping her on her way to recovery. Compared with the drought of 1991–1992 when she lost 60 percent of her cattle, she thinks herd recovery in 2001–2002 will be more difficult. The main reason for this is because her wealthy brother also lost many of his animals and will not be able to help her as much as in the past. In addition, local assistance networks to help impoverished herders are not as salient as they were in the 1970s and 1980s.

Case C. Gondara is a Gabra household head form North Horr who lost more than 50 percent of his livestock during the 1999–2000 disaster. He practices a very mobile form of pastoralism but still lost more than 50 percent of his livestock holdings. In addition to relying on food assistance, he feels that herd reproduction will be the main mechanism to assist herd recovery. He does not receive any remittances and is too far from markets to rely on these sources to rebuild his battered livestock herd. Already he says that recovery is well underway because he is focusing on goats, which have been giving birth in large numbers since the end of the drought. He also says that his productive female camels are already pregnant (October 2001) and will soon give birth. He also has given two goats to a fellow clan member who was particularly affected by the recent drought. He remains optimistic that his herds will recover within a few years.

The three case studies presented above show the different strategies that herders invoke to recover from drought. Those households in areas with good access to markets and employment sources, such as Ngambo, rely more on waged incomes and livestock purchases to recover, than the more remote sites (such as North Horr) where herd recovery is mainly through biological reproduction. Local livestock exchanges and gifts also seem to be more important in areas without favorable access to markets; in both Ngambo and Suguta Marmar local exchange systems were described as playing minimal roles in herd recovery.

3.2. Income and Expenditure

In the preceding section, we considered the issue of herd size and herd size change. This gave us some understanding of household welfare in terms of household assets (especially livestock) and household asset change. In this section, we investigate household welfare in terms of income and expenditure. We use these measures to provide some understanding of household welfare and food security during the study period.

To begin with, we consider the general pattern of income generation revealed in our data set. In Figure 5, we present the relative proportions of income accounted for by different activities in our total sample. The right side of the pie chart represents income generated from livestock or livestock products (livestock sales, milk sales, hide and skin sales). The left side represents non-livestock related income sources (salary labor, trading revenue, wage labor, firewood or charcoal sales, cultivation, craft sales, and water sales). Interestingly, there tends to be highly gendered access to different income sources, with women playing a key role in many of the non-livestock related activities (craft sales, cultivation, and firewood sales) and in the sale of dairy products.[9] In a related study, Nduma et al. (2001) find that there are differences between women that influence which of these activities will be emphasized. We expect that further analysis will deepen our understanding

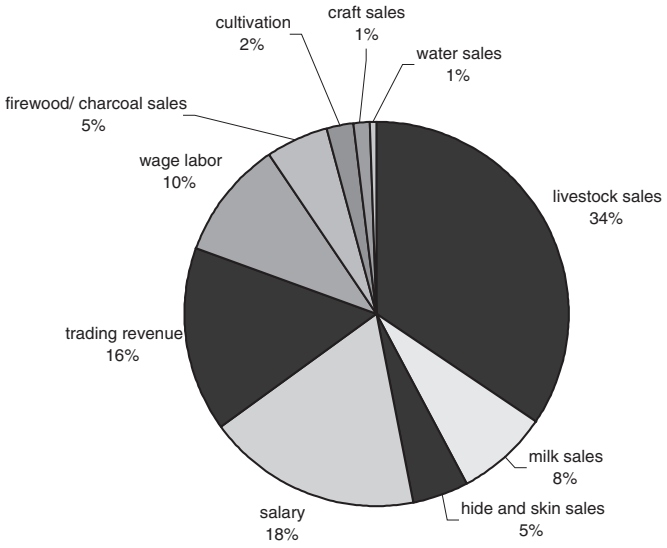

Figure 5. Overall shares of income from different sources in the data set.

of how individual characteristics, particularly gender and wealth, influence activity choice in this area.

Figure 5 indicates that slightly over half (53%) of the total income recorded for our households came from sources other than livestock or livestock product sales. When we turn to the site-specific data, we can see that this overall pattern varies significantly between sites. Figure 6 shows that non-livestock income sources provide the majority of income for three sites: Logologo, Ngambo, and Sugata Marmar. Intriguingly, these three sites have higher income than the sites where income from livestock accounts for the majority of income. It is also interesting to note that the income from livestock sales is less variable across sites than is the variability in income from non-livestock sources.[10] Those households with better access to markets and infrastructure have higher and more diversified incomes. These households also tend to be characterized by a greater degree of sedentarization and decreased mobility, but there are important exceptions to this tendency that are discussed later in the chapter.

We also asked households to report their cash expenditures over a two-week period for a variety of commodity categories.[11] The sum of these expenditures provides a measure of household well being, under the assumption that higher expenditures reflect higher consumption. We present these results as cash expenditures, which often provide a better indicator of well being than reported incomes. This partly is due to difficulties involved in accurately recording total income (see Little, 1997).

One problem with the cash expenditure measure is that it does not include the consumption of non-marketed goods. As milk consumed from household herds can constitute a major proportion of total household consumption in a pastoral setting, a low level of market involvement—hence cash expenditures—may not reflect low welfare if households are meeting their consumption needs by consuming milk from their herds. Milk production at the household level provides a significant contribution to household welfare, as seen in Figure 7, which presents the average amount of milk households reported was available for human consumption in each period.[12]

Recognizing the potential role home consumed milk plays in household well being, a measure of the value of home produced milk was constructed by valuing the daily milk

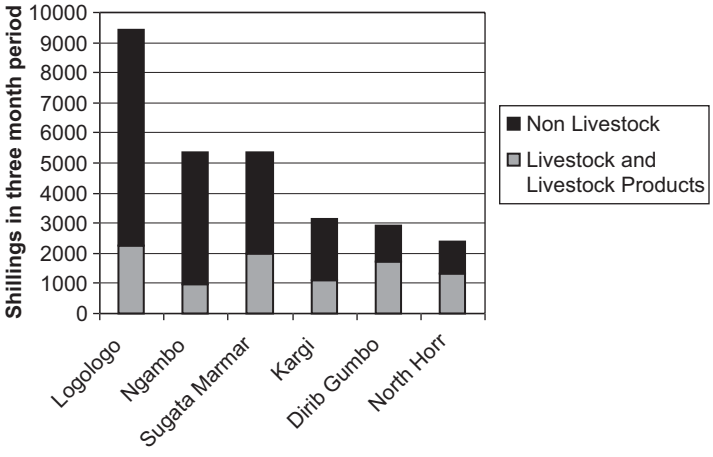

Figure 6. Total income reported over a three-month period.

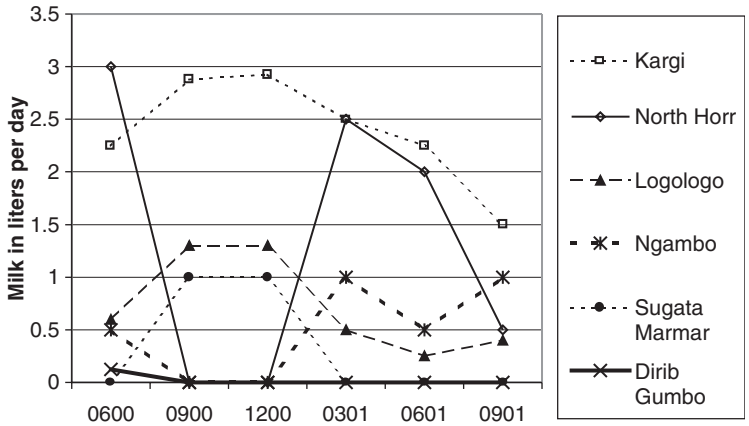

Figure 7. Median daily milk production per household for human consumption.

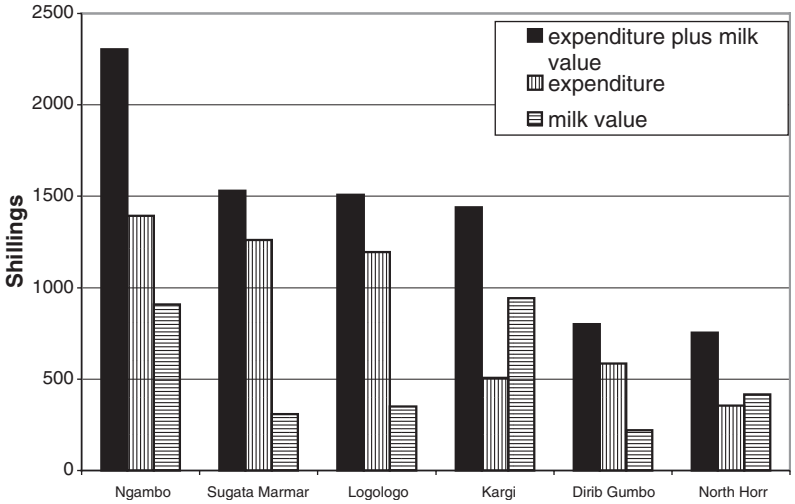

Figure 8. Well-being measures using average expenditure and the value of milk production.

production level reported by the household at the prevailing local market rate and summing this value over a two-week period. The resulting sum was then added to the two-week cash expenditure information to provide a more robust measure of household well-being. Figure 8 presents the average for each site for the following measures: the sum of the cash expenditure and the milk value, the cash expenditure alone, and the milk value alone.

The combined expenditure and milk value data presented in Figure 8 provide a slightly different perspective on household welfare than that provided by the income results presented in Figure 6. Ngambo has the highest welfare by the measure that combines cash expenditure and the value of milk, largely due to the fact that the market value of milk in Ngambo is the second highest of the six sites.[13] In addtion, Kargi appears better off by this measure than by the income measure, as a major part of the diet in Kargi is milk from the

herds. Both measures indicate that average welfare in Dirib Gumbo and North Horr is lower than that found in the other sites.

Variation in the expenditure and milk value measures provides one other perspective on household welfare (Figure 9). This is based on the idea that households attempt to smooth consumption over time. A household having food surplus to household needs in one season and then confronted by a food deficit in the following period would almost certainly be better off if they could consume the average of these two extremes in both periods. This would mean that higher variability in the expenditure and milk value measures is associated with lower welfare, as it is assumed that households would be happier if they could avoid such fluctuations in consumption over time.

Again, households in Dirib Gumbo and North Horr are worse off than households in other sites on average. Not only is the average measure of expenditure plus milk value lower than in other sites, it is also relatively more variable. We also find that Ngambo and Logologo are relatively better off by this measure. As shown earlier in Figure 5, salary labor, wage labor, and trading account for a great deal of non-livestock and livestock product income. One explanation for the positive welfare indicators in Ngambo, Logologo and Sugata Marmar is that these three activities account for 61%, 55%, and 41% of income respectively in these sites. In contrast, these three activities account for 30% in North Horr and Dirib Gumbo and 34% in Kargi. Increased welfare, as measured by higher average and less variable expenditure and higher income, are associated with higher levels of salary labor, wage labor, and trading.[14] Conversely, it should be noted that the three more diversified sites suffered severe herd losses during the recent drought (see Figure 3). However, in spite of these losses, it appears that households in more diversified sites were not as exposed to the risk of food insecurity as households in less diversified sites. This leads to the question, what allows one site to become more diversified than another site? Beyond issues of location and infrastructure discussed above, our findings suggest education may play a role in the diversification of household income generation activities. We turn to this topic in the next section.

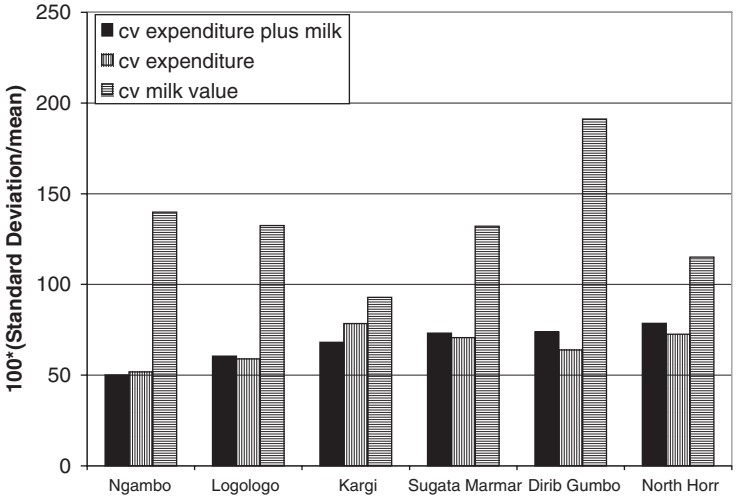

Figure 9. Coefficient of variation in average expenditure and the value of milk production.

3.3. Education

What role does education play in allowing access to the non-pastoral income sources noted in the previous section? To investigate this question, we sum the ages of all household members and the number of years each household member spent in school. This is used to derive the fraction of years spent by household members in a school, which provides a measure of past education. This is presented in Figure 10.

This measure of household education levels is closely related to the measure of the share of income that comes from non-pastoral sources. The areas where households have spent more time in formal schooling are also the areas that derive a higher share of their income from non-pastoral sources. Also, with the exception of Dirib Gumbo, the areas in which households have higher human capital stock of education are better off in terms of the income and expenditure measures of Section II and in terms of food insecurity.

We can again draw on our case study material to elaborate on this issue. The case of Letamara of Ngambo is illustrative of the positive role that education can play in food

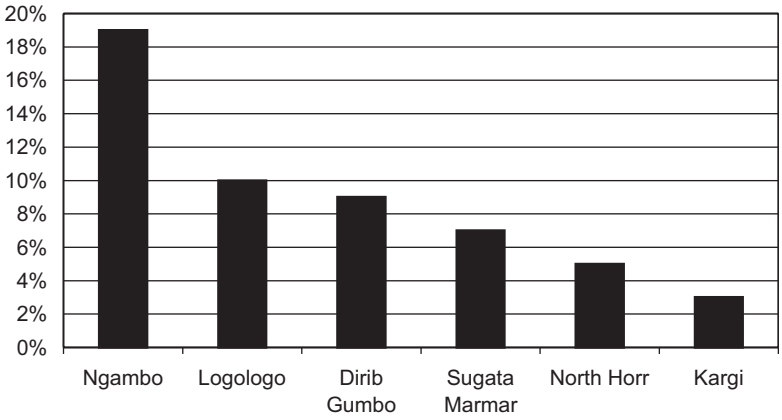

Figure 10. Percent of years household members spent in schooling.

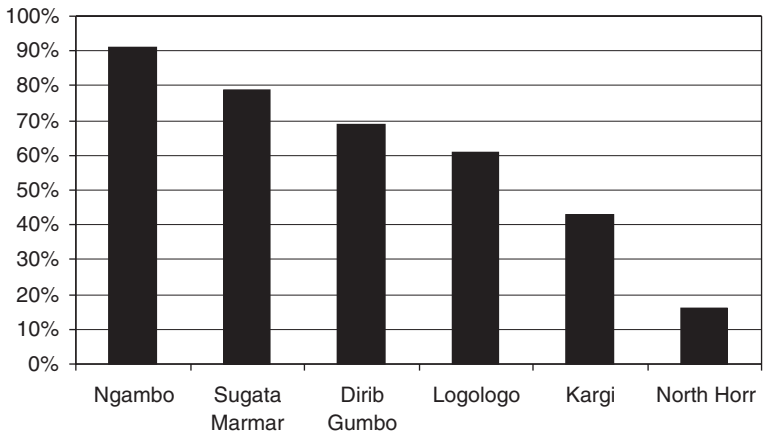

Figure 11. Enrollment of eligible children in school in 2000.

insecurity, even when livestock have been devastated by drought. Even before food relief came to Baringo in 2000, Letamara's household was able to purchase adequate food because he held a government job in Marigat and because his brother was employed in Nakuru town. This occurred despite the fact that he lost almost 80 percent of his livestock holdings and there was virtually no milk available from his herd for household members. Both Letamara and his brother had graduated from secondary school and in the case of the brother he had attained a college degree. Not only did remittances and wages allow Letamara's household to fare better than other households—even those with more livestock—but they also were able to help numerous other family members and relatives with food purchases.

We also present the enrollment rates for each of our sites for the 2000 school year. This provides a measure of current education levels. This information is presented in Figure 11.

The data indicate that enrollment of school age children differs drastically by site. When we compare these findings with the information on mobility presented in table two, it appears there is an inverse relationship between mobility and enrollment, a pattern that is especially apparent by contrasting Letamara's Ngambo area and Gondara's North Horr area. Sites where there is higher mobility have lower enrollment rates and vice versa. Thus, while Ngambo is the least mobile site in our study region (i.e., the most sedentarized), it has the highest levels of education and is among the most economically diversified communities in the area. Moreover, as we have shown above it has been able to parlay education into jobs and to avoid severe food insecurity by using wages and remittances to compensate for herd losses and low herd productivity. Gondara, by way of contrast, has never been to school and has none of his children in school. He finds it difficult to reconcile remaining near towns with the nomadic lifestyle demanded by his herds. However, he is optimistic that the mobile pastoral strategy will allow him to rebuild his herd quickly and thus avoid future food insecurity.

3.4. Comparisons of Different Communities

As this chapter has shown, there are considerable differences in the degree of sedentarization and diversification among the different research sites in our study region. Table 3 provides a summary of some of these findings as they relate to the general themes of sedentarization and pastoral welfare.

In spite losing over 80% of their herds, the average household in **Ngambo** fared relatively well during the recent drought, as shown by their relatively high mean milk value

Table 3. Summary of the Order of Sites for Different Measures (Ranked in Order of Importance).

Higher mean milk value + expenditure	More stable milk value + expenditure	Higher mean income	Higher non pastoral income %	Higher average herd size	Lower maximum herd loss	Higher water points used	Higher enrollment in 2000
Ngambo	Ngambo	Logologo	Ngambo	Kargi	Kargi	Kargi	Ngambo
Sugata M.	Logologo	Sugata M.	Logologo	North Horr	Sugata M.	Logologo	Sugata M.
Logologo	Kargi	Ngambo	Sugata M.	Logologo	North Horr	North Horr	Dirib G.
Kargi	Sugata M.	Kargi	Dirib G.	Dirib G.	Logologo	Ngambo	Logologo
Dirib G.	Dirib G.	North Horr	North Horr	Sugata M.	Ngambo	Sugata M.	Kargi
North Horr	North Horr	Dirib G.	Kargi	Ngambo	Dirib G.	Dirib G.	North Horr

plus expenditure value[15]. As we have demonstrated, Ngambo households have access to work opportunities in the nearby town of Marigat, which has a lively market and is connected by an all-weather road to Nakuru, and can also find work in the local irrigation cheme. Salary, wage labor, and trading account for over 60% of household income. Past education levels and current enrollment rates are the highest of any site in our study region.

In contrast, the average **Dirib Gumbo** household lost over 80% of their herd and their well-being does appear to have been negatively impacted by the drought.[16] Although Dirib Gumbo is not distant from the market town of Marsabit and Dirib Gumbo households have relatively high education levels, they have a relatively low share of their income from non-pastoral sources.[17] Salary, wage labor, and trading account for only 30% of household income. This is probably because most Dirib Gumbo households rely on rain fed agriculture in normal years. When the rains failed during the drought period covered by the study, many of the households sold livestock to meet consumption needs, which may explain why the share of income from livestock and livestock products is relatively high.

The average household in **Sugata Marmar** was not severely impacted by the drought in terms of herd loss or well-being. Partially, this may reflect the fact that the rainfall data from the area (see Figure 2) suggests the drought was less severe in Sugata Marmar than in other areas. It may also reflect the fact that households in this location have access to income generating opportunities arising from the large weekly market held in this town. Households in Sugata Marmar earn a relatively higher share of their income from trading (25%), than is found in any other site, and combined with income from selling their own livestock and livestock products (45% of income), they earn considerable revenues from trade. The mobility of livestock in this area differs from that in other areas perhaps because there are more water points available in the Samburu grazing lands. By relying on satellite herd camps and multiple established households, Sugata Marmar families appear to have found a compromise between mobility and education, as is seen by the relatively high enrollment rates.

The average household in **Logologo** lost roughly half their herd in the recent drought, but this does not appear to have severely impacted welfare as measured by mean income, mean expenditure, or variability in expenditure. Logologo is the only site where the income share from salary (42%) outweighs the income share from livestock and livestock products (35%). Just over half the salary earners work outside the area and are employed by NGO's, the police, the army, the wildlife service or work as watchmen. Schools, government departments, and the police employ local salary earners. Households in Logologo have established links to the larger national economy that allowed their welfare levels to be relatively unaffected during the recent drought.

The **Kargi** results provide an interesting nuance to our understanding of the process of sedentarization. Although the households in Kargi have settled, their animals remain highly mobile. The Kargi results show that pastoral production remains a viable production strategy in some areas. Kargi herders are relatively well off in terms of the mean and variance of the expenditure plus milk value measure, and they lost a relatively small percentage of their herd. Their isolation from market forces actually seems to have allowed them to pursue a form of mobile pastoralism well suited to their environment.

Contrasting the **North Horr** results with the Kargi results provides a fuller understanding of these points. North Horr households are more mobile than Kargi households, as many households still shift their entire household to a new area in search of pasture while in Kargi only the animals are sent. However, results show that Kargi animals are more mobile than North Horr animals. With regard to the viability of pastoral production, it should be

noted that the main difference in the welfare measures between North Horr and Kargi is the larger and less variable milk production in the latter site. Although it is not well reflected in the rainfall data for 1999–2001, the spatial distribution of rainfall observed in this area during the study period appeared to create more abundant pasture in key pasture areas used by Kargi herds compared to those used by North Horr herds.[18]

4. CONCLUSIONS

The causes and consequences of sedentarization are complex. In this chapter we have presented information drawn from household level surveys and interviews conducted during 2000 and 2001 in six different sites in northern Kenya. The period of data collection covered the onset of a drought and continues through the early stages of a recovery from the drought.

With regard to livestock wealth, we have shown that larger herds tend to be located in drier areas, where herders derive a higher share of their income from livestock and livestock products and also have more milk available for home consumption. With regard to changes to herd wealth in the drought, we find that areas where herds were more mobile suffered lower losses. We also have noted that households with larger herds before the drought tended to have larger herds after the drought, showing that herd accumulation at the household level provides a self-insurance role.

In contrast to our findings for livestock wealth, we find that areas with higher share of income from non-pastoral sources have higher welfare in terms of higher income, higher expenditure, and lower variability in the measure of milk value plus expenditure. In some cases they also are more food secure because they convert wages into food purchases. In this respect, we find that education seems to play an important role in how households earn their income and cope with food insecurity. Areas where household members have spent more time in formal education have higher shares of their income from non-pastoral sources and tend to have higher incomes and expenditure levels, including on food. We also find there is an inverse relationship between enrollment in school and mobility.

The findings in this chapter corroborate earlier work on pastoralism that suggests sedentarization attracts both poor and relatively wealthy herders (Barth, 1964; Little, 1985). The latter group appears ‘blessed’ in the kinds of opportunities they can pursue and the degree of support that they can provide the pastoral sector and their mobile relatives and family members. In contrast, the poor appear ‘cursed’ in the kinds of unremunerative activities they engage in and the extent to which they are caught in a vicious cycle of low incomes, low mobility, and high food insecurity.

Where this chapter departs from these and other studies of sedentarization in Africa and elsewhere is by showing how the process does not necessarily equate to less herd mobility. By utilizing mobile satellite camps, certain members of pastoral households can be sedentary and pursue activities usually associated with sedentarization (waged employment, agriculture, and/or education) while their animals continue to move opportunistically according to climate and resource conditions. These novel forms of adaptation show that while serious development and food security problems still confront pastoral communities of northern Kenya, the pursuit of non-pastoral, sedentary-like activities does not forecast an end to pastoralism. Indeed, we have argued that the types of non-pastoral (‘supplemental’) activities discussed in this chapter may be what will allow mobile pastoralism to continue in the area for the foreseeable future.

NOTES

1. The PARIMA project is a collaborative effort of 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. This paper has benefited from discussions with our project colleagues: Abdillahi Aboud, Christopher Barrett, D. Layne Coppock, Cheryl Doss, Getachew Gebru, and Hussein Mahmoud. PARIMA is supported by the Global Livestock Collaborative Research Support Program, funded by the Office of Agriculture and Food Security, Global Bureau, USAID, under grants DAN-1328-G-00-0046-00 and PCE-G-98-00036-00. The opinions expressed do not necessarily reflect the views of the U.S. Agency for International Development.
2. This map was prepared by Ingrid Rhinehart.
3. An interesting variable that generally correlate both with rainfall and the extent of sedentarization is ownership of poultry (chickens). From highest rainfall to lowest: the presence of poultry in the study area was: Dirib Gumbo (57 percent own chickens); Ngambo (73 Percent); Suguta Marmar (40 percent); Logologo (60 percent); Kargi (20 percent); and North Horr (6 percent). As will become more evident below, generally the more mobile the community is, the less important are poultry.
4. Although we describe each settlement by noting the majority ethnic group present in the location, it is important to note that in each site, there are minority populations from other ethnic groups. Given our areal sampling method, members of these minority groups are often represented in our data.
5. Herd size is measured in Total Livestock Units (TLU) following the weighting of the Range Management Handbook of Kenya, where 1 head of cattle = 0.7 camels = 10 sheep = 11 goats.
6. Herd size per capita follows roughly the same pattern, as the average household size is 6 in Kargi and North Horr, 7 in Dirib Gumbo, and 8 in Logologo, Sugata Marmar, and Ngambo.
7. By September 2001 stockless households accounted for 25% of sample households in Dirib Gumbo, 16% in North Horr, 11% in Sugata Marmar and Ngambo, and 3% in Kargi and Logologo.
8. Peter Little developed the interview guidelines for these case histories and the interviews were conduced by Hussein Mahmoud and translated by local research enumerators.
9. One contradictory aspect of sedentarization this leads to is that while sedentarization often decreases household welfare, it frequently opens up new income opportunities for women (Fratkin and Smith 1995). The gendered dimensions of pastoral diversification in our study region are more fully reported in Little et al., 2001).
10. With regard to diversification of income sources, it is important to distinguish between a given household diversifying into different activities and diversification of different households in a given community into different activities. To make this distinction, we construct a measure of activity concentration that sums the square of the square of the percentage income from each activity. At the household level, concentration of income sources from highest to lowest is as follows: Dirib Gumbo (.90), Kargi (.89), Logologo (.88), Ngambo (.82), North Horr (.76), and Sugata Marmar (.75). At the community level, concentration of income sources from highest to lowest is as follows: Logologo (.28), Dirib Gumbo (.27), Kargi (.24), North Horr (.21), Sugata Marmar (.21), and Ngambo (.20). This indicates there is a great deal more diversification between households than there is within households.
11. The categories are: grains/ flour, sugar / honey, tea / coffee, cooking oil / fat, beans, vegetables / onions / potatoes, meat / milk, tobacco / snuff / miraa, clothes / shoes for self, clothes / shoes for others, beads / jewelry.
12. The ordering of overall milk production is largely reflective of the overall ordering of herd size (median liters of milk per day in parentheses): Kargi (2.5), North Horr (1.5), Logologo (0.6), Ngambo (0.5), Sugata Marmar (0.2), and Dirib Gumbo (0).
13. The cash value of milk is roughly 20 shillings per liter in Kargi and North Horr, 30 shillings per liter in Logologo and Sugata Marmar, 50 shillings per liter in Ngambo, and 60 shillings per liter in Dirib Gumbo.
14. Recall that this conclusion is drawn based on community level averages. Analysis at the household level will provide a more nuanced understanding of this relationship.
15. This assessment is relative to other sites and should not imply that Ngambo households, especially the poorer units, did not suffer during the recent drought.
16. While we do not have firm data to confirm this, it is likely that at least part of the explanation for the severe herd losses experienced in Dirib Gumbo are related to ongoing political conflict over territorial claims and tension between ethnic groups on Marsabit mountain. In contrast to other groups, the Boran of

Dirib Gumbo do not have easy access to lowland pastures surrounding Marsabit mountain due to ongoing struggles over land and water claims among the different groups in Marsabit District.

17. An intriguing topic for further research is an investigation of what causes, if any, can be identified for the relatively low rates of households with access to remittance income when compared to other sites around Marsabit Mountain.
18. This fact does not seem to have escaped the attention of Gabra and Rendille herders. During this period, a relative peace has held between the Gabra and Rendille. They have reached an agreement harmonizing penalties for murder and other personal liabilities, and have used each other's grazing land.

REFERENCES

Barth, F., 1964, 'Capital Investment and the Social Structure of a Pastoral Nomadic Group in South Persia.' In *Capital, Savings and Credit in Peasant Societies*, edited by R. Firth and B.S. Yamey, pp. 415–425. London: Allen and Unwin.

Fratkin, E., 1991, *Surviving Drought and Development: Ariaal Pastoralists of Northern Kenya*. Boulder: Westview Press.

Fratkin, E. and K. Smith, 1995, Women's Changing Economic Roles and Pastoral Sedentarization: Varying Strategies in Alternative Rendille Communities. *Human Ecology* 23 (4): 433–454.

Little, P.D., 1985, 'Social Differentiation and Pastoralist Sedentarization in Northern Kenya.' *Africa* 55 (3): 243–261.

Little, P.D., 1992, *The Elusive Granary: Herder, Farmer, and State in Northern Kenya*. Cambridge: Cambridge University Press.

Little, P.D., 1997, *Income and Assets as Impact Indicators*. Washington, DC: Management Systems International.

Little, P.D., K. Smith, B.A. Cellarius, D.L. Coppock, and C.B. Barrett, 2001, Avoiding Disaster: Diversification and risk management among East African herders. *Development and Change* 32 (3): 401–433.

Kenya, Government of, 1980, *District Development Plan, Baringo District, 1979–1983*. Nairobi: Government Printers.

Nduma, I., P. Kristjanson, and J. McPeak, 2001, Diversity in Income-Generating Activities for Sedentarized Pastoral Women in Northern Kenya. *Human Organization* 60 (4): 319–325.

Snow, R. and J. Morris, 1984, Do Relief Efforts Beget Famine? *Cultural Survival Quarterly* 8 (1): 51–53.