Surviving pastoral decline: pastoral sedentarisation, natural resource management and livelihood diversification in Marsabit District, Northern Kenya Deel: "Vol. I"

Witsenburg, K.M.; Roba, A.W.

Citation for published version (APA):

General rights
It is not permitted to download or to forward/distribute the text or part of it without the consent of the author(s) and/or copyright holder(s), other than for strictly personal, individual use, unless the work is under an open content license (like Creative Commons).

Disclaimer/Complaints regulations
If you believe that digital publication of certain material infringes any of your rights or (privacy) interests, please let the Library know, stating your reasons. In case of a legitimate complaint, the Library will make the material inaccessible and/or remove it from the website. Please Ask the Library: https://uba.uva.nl/en/contact, or a letter to: Library of the University of Amsterdam, Secretariat, Singel 425, 1012 WP Amsterdam, The Netherlands. You will be contacted as soon as possible.
Introduction to the study area

In this chapter we will examine the stock of resources (or capitals) that form the basis for human and ecological production in Marsabit District. After introducing the study area in terms of its physical location, we will deal with the region's natural capital. In doing so, we will first focus on the climatic conditions, paying specific attention to rainfall and changes in rainfall patterns. The need for a special focus on rainfall patterns stems from the fact that it directly affects the availability of a wide range of resources in arid areas. Rainfall is indeed the single most important factor that influences the productivity of both rangeland and rainfed agriculture in arid and semi-arid environments (Mati 2000; Oba 2001). Recognising the importance of rainfall in the area, we will analyse changes in rainfall patterns on Mt Marsabit rainfall station and compare these with other meteorological stations in northern Kenya. We will further assess whether and how climate variability affects livestock production and crop yields.

In this chapter we will also pay attention to the most important capital in the study area, livestock, recognising that livestock is not only natural capital but should also be considered as financial, cultural and social capital (as discussed in Chapter 2). We will present livestock population data at district level (Marsabit District), with a view to providing a basis for understanding the dynamics in the livestock sector which is subject of later chapters.

Subsequently, we will pay attention to other forms of natural capital, such as soils, vegetation and forest resources. In the section of human capital we present data on population figures, ethnic and language characteristics of the population and on population dynamics. The latter is, in particular, an issue of special interest to this study. We end the overview of capitals with water sources that constitute the most important form of physical capital in pastoralist societies.

After that, we will continue by introducing the sources of livelihood available to the population other than pastoralism. We end this chapter with a section on the social institutions that determine people’s access to resources.
Map 4.1
Location, forests and selected main towns in Marsabit District

Source: Based on Kifugo et al. (1994).
The physical location of Marsabit District

Marsabit District is located in Northern Kenya and lies between latitudes 04° 45' North and 1° and between longitudes 36° 02' East to 39° 23' East (Marsabit District Development Plan 1974, 1994: abbreviated to MDDP hereafter). Map 4.1 shows the district, with the names of the trading centres that were included in the sample in bold. The district is bordered by Ethiopia and Moyale District in the north, by Wajir District to the east and by Isiolo District to the southwest. To the west, the district is bordered by Turkana District (and L. Turkana in between) and Samburu District to the southwest.

Marsabit District covers a total area of 69,340 km$^2$ and rises to 1,072 m above sea level (a.s.l.). The district is largely inhabited by nomadic groups and has a generally semi-arid climate with poor soils, except for a few high altitude areas such as Mt Kulal (2,335 m), Hurri Hills (1,685 m) and Marsabit Mountain (1,865 m) (Schwartz et al. 1991). The high altitude areas have a rich diversity of fauna and flora. The top of the mountain is covered by dense evergreen forest and the escarpment slopes below by open woodland.

In addition, these areas are endowed with deep, fertile and well-structured volcanic soils, which are suitable for arable farming if there is adequate rainfall. They also produce an abundant crop of tall perennial grasses. The lower slopes are covered by wooded grassland with various types of acacia trees and isolated forest tree remnants on the farmlands (MDDP 1979, 1988, 1993). In sum, the climatic and vegetation conditions in the high altitude areas, of which Marsabit Mountain is the largest, enable human agricultural livelihoods and support a whole range of economic activities (Marsabit District Annual Reports, various years – MDARs for brevity from now on) which has encouraged human immigration and the subsequent establishment of settlements on the mountain to utilise these economic opportunities.

There are also a few low drainage basins or floodplains to be found in the district. One of these is the saline Chalbi basin, which is the lowest floodplain in the region (Tablino 1999), at about 435-500 m above sea level and occupying an area of 36,000 km$^2$. The Kaisut basin of Hedad plain of southwest Marsabit Mountain and the Dida Galgallu plain in the north are two other low drainage basins in the district. These low drainage basins serve as receptacles for run-off waters downstream from the high altitude areas in the region (Map 4.2). As a result, these areas (particularly the Hedad and Chalbi basins) have high groundwater tables and are important areas where sources of water (e.g. hand-dug shallow wells and springs) are found. The low altitude areas are mainly suitable for nomadic pastoralism. The agricultural productivity of the district’s specific agro-ecological zones decreases with increasing numeric classification (see the legend).

---

1 The lines joining the trading centres are road networks, and the outer lines are the district’s boundary.
2 The reader should note that Moyale has been a separate district and part of Marsabit at different times, as will be stated later too.
The mountain slopes, although mostly suitable for livestock rearing, are currently used for arable farming, made possible by deep and fertile volcanic soils and a mean annual rainfall of 800 mm. The mountain top and the slopes below belong to the ecological zones II and IV, respectively (MDDP, various years). In addition, the mountain top frequently experiences early-morning mist that is naturally tapped by mosaic lichen hosted by *Olea africana*; the dominant, multi-purpose and most preferred tree by the local communities.

Korr and Maikona, the two main lowland villages of interest for our study, lie in the plains below 700 m a.s.l., surrounding the mountain. They both belong to ecological zone VI. This zone constitutes over 5 per cent of the district’s total land area (MDDP 1979; Schwartz et al. 1991). Its vegetation mainly comprises annual species of poor quality grass, which are irregular in distribution. The zone receives an average annual rainfall of about 200-300 mm but rainfall is extremely unpredictable (Figure 4.1). When the rains fail, the area can hardly support cattle but can be used by camels and small stock if dwarf shrubs are abundant. The grazing seasons are extremely short, lasting for a few months after the rains. The temperature ranges between 33 and 35°C and potential evaporation rates are as high as 3,000 mm/a. The soils are for most parts well drained shallow to gravelly sandy loam.
Climate

Marsabit District is one of the driest districts in Kenya (GoK 1996). The rainfall in the district is usually erratic, unreliable and highly variable in space and time. In spite of this, rainfall remains the most important climatic factor affecting the region’s overall economic production. In general, the district has a bi-modal rainfall pattern, as shown by the Figures 4.2 and 4.3. In the highland areas, average rainfall ranges between 800-1000 mm annually, and in the lowlands between 200-250 mm and less per year. It is also quite normal for areas like the Kaisut and Chalbi deserts to receive no rain at all over the course of a number of years (MDDP various years; Fratkin 1998).

During normal years, rainfall occurs in two dominant rainy periods that create the four weather conditions of two wet and two dry seasons. If wet seasons occur, they take place between March and May (‘long-rain’) and between October and November (‘short-rain’) (Figures 4.2 and 4.3). The dry seasons occur between November and March (‘short dry’) and between June and October (‘long dry’). The rainfall patterns also vary considerably between seasons, time, space and regions. Table 4.1 shows mean annual rainfall figures for some selected locations in the district.

<table>
<thead>
<tr>
<th>Site</th>
<th>Mean annual rainfall (mm)</th>
<th>by ecological zones</th>
<th>Mean annual rainfall (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>High altitude area</td>
<td></td>
<td></td>
<td>Low altitude area</td>
</tr>
<tr>
<td>Marsabit Mt.</td>
<td>800</td>
<td>Kulal</td>
<td>737</td>
</tr>
<tr>
<td>Moyale</td>
<td>737</td>
<td>Log-logo</td>
<td>381</td>
</tr>
<tr>
<td>Maikona</td>
<td></td>
<td>N/Horr</td>
<td>203</td>
</tr>
<tr>
<td>N/Horr</td>
<td>127</td>
<td>Korr</td>
<td>183</td>
</tr>
</tbody>
</table>

Source: Daystar Communications, 1982a,b &c; KARI-Korr Station, 1998.

---

3 Marsabit District receives an average of 500 mm of rain annually.

4 Apart from the mean annual rainfall figures for Korr, the rest of the mean figures are from the Daystar report (1982: 13). The rainfall figures for Korr were derived from annual rainfall figures of between 1989 and 1997 (Korr-Kari station).
Rainfall affects economic performance in the district by determining whether rain-fed agriculture on the mountains is possible or not and by influencing the productivity of range resources. Thus, rainfall is the most critical factor with regard to arable production on the mountain and limits the productivity of the surrounding rangelands. That makes it the principal factor determining the availability of pasture and forage for livestock and of the amount and distribution of water resources for human and livestock requirements and arable production. The different seasons are important as they are associated with the distribution of...
resources in space and time and because they influence the intensity of resource use. The availability or lack of these resources may, in turn, partly determine the amount of food production and the corresponding human welfare.

During wet seasons there are many water sources (e.g. pools, pans and dams) that allow an opportunistic use of forage. However, the dry seasons are characterised by inadequate water resources that are unevenly distributed as a result of which the availability of permanent water resources is confined to specific locations such as motorised deep boreholes at Logo-logo, Bubisa, Walda, and shallow hand-dug wells at Maikona, Kargi, Korr and Illaut where the range is not particularly favourable for large numbers of herds.

Rains sometimes come in torrential downpours that are associated with huge losses of topsoil through run-off water downstream and animal deaths. Owing to their weak physical condition after prolonged drought, animals may also die during the severe cold spells that often accompany the first rain showers and, especially, as a result of prolonged drenching. For example, Tablino (1999) describes 1954 as a typical year in Gabra during which torrential rains caused the death of many small stocks (ibid: 206). The recent ‘El Niño’ rains of 1997/98 had a comparable life-claiming effect on the livestock. At other times, poor distribution and small amounts of rainfall make ecological production conditions harsh and life difficult, as well as highly uncertain. The highlands and the lowlands are, however, not isolated ‘islands’ independent of each other; they have strong ecological production linkages. When sufficient rain falls in the highlands, the nomadic groups in the lowlands receive water through seasonal dry-river (lagas – perennial rivers) basins, which drain flows of water run-offs from the high altitude areas into the seasonal flood plains. For example, whenever it rains in the highlands of Marsabit Mt., Ndoto, Hurri Hills and Mathew’s Ranges, gravity causes water to flow into the plains such as Chalbi and Kaisut in the lowlands where it creates a very important production basis. Such water flows sometimes come as a relief during critical moments of dry spells when it has not rained in the surrounding lowlands for seasons on end, hence bringing much needed and long awaited water to the pastoral communities inhabiting these zones.

The temperatures throughout the district vary between the highlands and the surrounding plains, as well as across annual seasons. In general, the lowlands experience high temperatures of about 35°C during day hours and, accordingly, high evaporation rates. The high relief areas, like Mt. Marsabit, have modest average monthly maximum temperatures in the range of 23-27°C (Figures 4.4a and b). While average annual temperatures of about 30°C are common in the lowlands, the mean annual temperatures are about 20°C in the highlands, where it is sometimes even cold and chilly, particularly in Marsabit Mt. during the months of July and August (Figure 4.4b). During these months, the mountain is often covered with drizzling clouds and mists in the mornings and sometimes temperatures drop to as low as 14°C in the early morning hours.
Rainfall variations for Marsabit Mountain

As mentioned above, rainfall is the principal factor that influences plant life and human occupation and determines the climatic variations in arid and semi-arid regions of Africa. The importance of temporal and spatial rainfall distributions arises from the fact that adverse weather elements can pose a threat to life, enable economic production and fuel environmental changes. The recent experiences of the devastating 1997/98 El Niño rains and floods, and one of the most severe droughts in Kenya's history in the post-El Niño period are a case in point. The general conjecture of global climatic changes in many parts of the world today makes this experience not unique to Kenya. The present study offers the opportunity to examine the effects of El Niño rains on livestock, farming, forest resources, hence on rural livelihoods.
The mean annual rainfall on the mountain varies moderately, with a coefficient of variation of about 33 per cent. This variability is low compared to other areas in the district: 53 per cent for Ngurunit and 61 per cent for North-Horr. One crucial question is whether rainfall amounts in a region significantly differ between past and recent decades (see Table 4.2 below).

**Comparative trends of rainfall patterns in the northern Kenya region**

We obtained monthly rainfall data for six stations in northern Kenya (Table 4.2). All the six stations are located in an area with arid and semi-arid climates. This data was collected with the intention to investigate and track changes, if any, in rainfall patterns for the region as a whole, rather than focusing on a single station or micro-level variations in annual rainfall.

This subsection compares the rainfall variability on the mountain with data on other meteorological stations in the northern Kenya region and links that to livestock populations. Figure 4.5 illustrates long-term trends in rainfall, the five-year moving average and annual rainfall amounts for Marsabit Mountain. Table 4.2 and Figures 4.5 (a-f) consider region-wide rainfall trends for a few stations in the northern part of Kenya.

<table>
<thead>
<tr>
<th>Station</th>
<th>Latitude</th>
<th>Longitude</th>
<th>Altitude (m)</th>
<th>Duration (n)</th>
<th>Mean (in mm)</th>
<th>C.V. (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Marsabit</td>
<td>02° 19' N</td>
<td>37° 59' E</td>
<td>1,345</td>
<td>83</td>
<td>806.66</td>
<td>37.8</td>
</tr>
<tr>
<td>Moyale</td>
<td>03° 32' N</td>
<td>39° 03' E</td>
<td>1,097</td>
<td>83</td>
<td>692.68</td>
<td>31.3</td>
</tr>
<tr>
<td>Lodwar</td>
<td>03° 07' N</td>
<td>35° 37' E</td>
<td>506</td>
<td>69</td>
<td>185.15</td>
<td>58.3</td>
</tr>
<tr>
<td>Madera</td>
<td>03° 56' N</td>
<td>41° 52' E</td>
<td>331</td>
<td>64</td>
<td>253.46</td>
<td>60.3</td>
</tr>
<tr>
<td>Wajir</td>
<td>01° 45' N</td>
<td>40° 04' E</td>
<td>244</td>
<td>83</td>
<td>293.20</td>
<td>61.5</td>
</tr>
<tr>
<td>Garissa</td>
<td>00° 29' S</td>
<td>39° 38' E</td>
<td>147</td>
<td>80</td>
<td>342.56</td>
<td>53.8</td>
</tr>
</tbody>
</table>

Note: C.V. denotes coefficient of variation: standard deviation and mean ratio expressed in percentages.  

As the table demonstrates, the period for which data is available varies from one station to another. From the table, Marsabit and Moyale seem to be similar in a number of ways compared to the other stations. These two stations receive relatively high amounts of rainfall, averaging about 800 mm and 700 mm a year, respectively, because they are at a much higher altitude than all the other locations. Garissa and Wajir receive about 300 mm and Madera roughly 250 mm per year. Lodwar has the lowest average annual rainfall amount, compared to all the other areas. From the table, the latter four stations also exhibit higher variability in mean annual rainfall. This suggests that rainfall is generally low as well as unreliable at these stations. Moyale and Marsabit are at the margin and likely to experience almost one and a half times lower variation of mean annual rainfall than the other four stations.

As the Figures 4.5(a-f) show, contrary to what might have been the trend elsewhere in Africa, there are seemingly increasing trends of rainfall amounts especially for Madera (an increase of 1.4), Wajir (+1.3) and Garissa (+1.1), and comparatively marginal increases for Moyale (+0.3) and Lodwar (+0.2). Surprisingly, Marsabit is the only station that registered a moderate decline in long-term annual rainfall and a five-years moving average – a decrease of

---

5 The changes in rainfall amounts are based on five years of moving averages and a relative change in annual rainfall for the respective station basically corresponds to the slope (gradient) of the trend line.
1.6 mm every 5 years (see also Figure 4.6 below). None of these changes represent, however, any significant differences in average annual rainfall between the last four decades compared to the earlier four. Moreover, splitting rainfall data into three periods and running the significant t-test reveals no mean annual rainfall differences, neither for any station nor between periods. This means that in a statistical sense the amount of rainfall received at any of the stations does not vary significantly between former and recent decades.

As we also stated above, the results show a marked divide between the rest of the stations on the one hand, and Marsabit and Moyale on the other. They both apparently show differences in terms of relatively high altitude, mean annual rainfall and lower variability of rainfall relative to the other stations (see Table 4.3). Using this as a starting point, we examined the variability in annual rainfall for Marsabit and Moyale during only the last few decades compared with the previous ones.

**Figure 4.5**
Trends in annual rainfall for selected stations in northern Kenya

* a. Total annual rainfall for Marsabit, 1920-2001

* b. Total annual rainfall for Moyale, 1916-2001

---

6 This difference is investigated by splitting the data into two equal periods of 41 years each. The
c. Total annual rainfall for Wajir, 1919-2001


d. Total annual rainfall for Mandera, 1936-2001


e. Total annual rainfall for Garissa, 1922-2001


correspondingly t-test statistic is $t_{0.025, 80} = 1.960$ (p>0.157).
f. Total annual rainfall for Lodwar (Turkana), 1933-2001

Notes:

a. See Table 4.2 for valid number of years for which rainfall data is available for each of the stations.

b. Disjointed trend lines for Moyale (1942, 1943 and 1944) and Mandera (1940 and 1941) are due to missing rainfall data.

Source: Author’s compilation based on data from the Kenya Meteorological Station, 2002.

Table 4.3
Location and altitude of some selected stations in northern Kenya region

<table>
<thead>
<tr>
<th>Station</th>
<th>Period</th>
<th>Period Average</th>
<th>Percent quartile dev. from the mean (%)</th>
<th>t - statistics</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>&lt;25 &lt;50 &lt;75 Average 125+</td>
<td></td>
</tr>
<tr>
<td>Marsabit</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1st half</td>
<td>1920 - 1960</td>
<td>819.58</td>
<td>0 1 7 22 11</td>
<td>0.275 1.841*</td>
</tr>
<tr>
<td>2nd half</td>
<td>1961 - 2001</td>
<td>800.92</td>
<td>1 2 10 17 10</td>
<td></td>
</tr>
<tr>
<td>Moyale</td>
<td>1st half</td>
<td>1917 - 1960</td>
<td>661.14</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1961 - 2001</td>
<td>719.40</td>
<td>0 3 7 27 4</td>
<td>1.218 1.034</td>
</tr>
<tr>
<td>2nd half</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Notes:

a. The table is based on the last 82 years although data for three years (1942 - 44) is missing for Moyale. We have compensated for this missing data by including the previous three years.

b. Overall mean (see Table 4.2) is used to derive quartile deviations for each station. Each quartile deviation excludes the previous: i.e. less than 50 per cent quartile excludes years with less than 25 per cent of rain below the mean.

c. Under t-statistics, ‘All’ means that the differences in mean annual rainfall have been assessed for the entire period (column 2) by splitting the data into two equal parts. Under ‘60 years’ the differences in mean annual rainfall have been investigated for only the last 60 years (two periods of 30 years each).

d. Mean difference is significant at the 0.10 per cent level.

As we already noted above, Marsabit has a relatively higher monthly rainfall variation compared to Moyale (see also previous Figure 4.2). Both Marsabit and Moyale stations registered an annual rainfall deviating at least 75 per cent from the long-term mean over many years, implying that the rainfall amounts in these years exceeded the average annual rainfall for the entire period (i.e. the long-term mean). Over the last 82 years and as far as Marsabit and Moyale are concerned, about 26 per cent and 15 per cent of the years, respectively, were exceptionally good and even excessively wet years. That is, in each year there was an annual rainfall amount of 125 quartile deviation above the mean annual rainfall for the entire period (see column 8). This shows that, on average, Marsabit is wetter than Moyale. The years with
at least 125 per cent rainfall, including years with at least 1,000 mm of rain for Marsabit and at least 860 mm for Moyale, correspond to years with high amounts of rainfall.

Once again, there are no apparent statistically significant differences in the mean total rainfall between the first and the second periods for either of the stations, using the student t-test. By way of an alternative, we considered the distributional pattern of years with lowest and highest amount of rainfall (bottom ten driest and top ten wettest years) for both stations over the last 80 or so years (Table 4.4) and contrasted them across the decadal mean annual rainfall.

Table 4.4
Top ten wettest or bottom ten driest years for Marsabit and Moyale, 1922-2001

<table>
<thead>
<tr>
<th>Year</th>
<th>1920s</th>
<th>1930s</th>
<th>1940s</th>
<th>1950s</th>
<th>1960s</th>
<th>1970s</th>
<th>1980s</th>
<th>1990s +</th>
</tr>
</thead>
<tbody>
<tr>
<td>Top 10</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>1923</td>
<td>1930</td>
<td>1944</td>
<td>1953</td>
<td>1961</td>
<td>0</td>
<td>1980</td>
<td>1997</td>
</tr>
<tr>
<td></td>
<td>(1,281)</td>
<td>(1,373)</td>
<td>(1,164)</td>
<td>(1,173)</td>
<td>(1,957)</td>
<td>(1,151)</td>
<td>(1,444)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>(930.4)</td>
<td></td>
<td>(1,290)</td>
<td>(1,099)</td>
<td>(1,080)</td>
<td>(1,195)</td>
<td>(1,346)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bottom 10</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>0</td>
<td>0</td>
<td>1945</td>
<td>1950(499.2)</td>
<td>0</td>
<td>1973</td>
<td>0</td>
<td>1991</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>(452.9)</td>
<td></td>
<td>(450.8)</td>
<td></td>
<td>(409.9)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>(370.6)</td>
<td></td>
<td>(412.1)</td>
<td></td>
<td>(492.3)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1996</td>
</tr>
<tr>
<td>2</td>
<td>1927</td>
<td>1930</td>
<td>1941</td>
<td>1955(386.1)</td>
<td>0</td>
<td>1973</td>
<td>'84</td>
<td>1996</td>
</tr>
<tr>
<td></td>
<td>(477.3)</td>
<td>(402.3)</td>
<td>(348.0)</td>
<td>(354.1)</td>
<td></td>
<td>(354.1)</td>
<td></td>
<td>(466.7)</td>
</tr>
<tr>
<td></td>
<td>1928</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(452.9)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Decadal mean

<table>
<thead>
<tr>
<th>Decadal mean</th>
<th>1</th>
<th>2</th>
</tr>
</thead>
<tbody>
<tr>
<td>1920s</td>
<td>755.88</td>
<td>1068.01</td>
</tr>
<tr>
<td>1930s</td>
<td>819.43</td>
<td>869.34</td>
</tr>
<tr>
<td>1940s</td>
<td>865.73</td>
<td>526.34</td>
</tr>
<tr>
<td>1950s</td>
<td>849.05</td>
<td>739.14</td>
</tr>
<tr>
<td>1960s</td>
<td>999.73</td>
<td>868.97</td>
</tr>
<tr>
<td>1970s</td>
<td>1158.81</td>
<td>677.79</td>
</tr>
<tr>
<td>1980s</td>
<td>852.98</td>
<td>727.21</td>
</tr>
<tr>
<td>1990s +</td>
<td>714.24</td>
<td>661.00</td>
</tr>
</tbody>
</table>

Note: 1 = Marsabit, and 2 = Moyale.

From the decadal averages it follows that the 1960s were the wettest decade with rainfall being about 24 per cent and 25 per cent above individual overall mean for Marsabit and Moyale respectively. Moyale experienced the driest decade in the 1940s, while for Marsabit the 1920s, 1970s and 1990s were the driest decades (see also Figure 4.3, also Figure 4.6 below). Additionally, Moyale had its four wettest years in the 1960s and its three driest years
in the 1990s and Marsabit had clusters of five driest years during the last decade. It is also clear that, whereas 1930 and 1941 were years of good rain for Moyale, these were years of below mean rainfall in the case of Marsabit. Furthermore, we can see that years with good and poor amounts of rainfall follow each other in the case of Marsabit. Examples are 1944 and 1945 and 1996 and 1997. The closeness of wet and dry years in time emphasises a high variability between individual years. The wide variations in rainfall on a year-to-year basis also provide evidence of boom and bust cycles of production\(^7\) – high production in good years of rain and low production in poor years of rain (Oba 1996; Scoones 1993). This feature is specifically noted in arid environments where the production system depends heavily on rainfall. If we look at Figure 4.6 and particularly at the data relating to Marsabit station, the graph clearly illustrates a sharp fall in the annual rainfall during the last 40 years or so. In terms of the decadal differences, the rainfall between 1960 and 2001 (Figure 4.6b) shows a more proportionate decrease (relative decrease of 8.7 per year) compared to a marginal increase between 1919 and 1960 (at a relative rise of 2.5 per year). This would suggest an increased possibility of reduced annual rainfall during the latter period relative to the earlier one.

\(^7\) Such cycles are at times referred to in the literature as random variable, or stochastic shocks.
The mean annual rainfall for Marsabit is 11 per cent below the overall average during the last decade and this decade also has the lowest average rainfall in comparison to all the other decades. However, during this decade 1997 was one of the wettest years covered by the data period. Following on from this observation and using a climatic time scale of 30-40 years, Marsabit has a mean of about 878 mm in the period 1939-1960 and 731 mm of rainfall in the period 1961-2001. The corresponding averages for Moyale are about 734 mm and 670 mm of rainfall. These annual mean values are statistically significantly different for Marsabit during the last 30 years - 60 years split into two equal numbers of years ($t_{0.1, 58}=1.645$, $p<0.002$). The annual mean rainfall is neither statistically different for Moyale ($t_{0.1, 58}=1.645$, $p>0.616$) nor for Wajir ($t_{0.1, 58}=1.645$, $p>0.923$). On the basis of this result, Marsabit experienced lower rainfall, on average, over the last three decades compared to the previous thirty years. This result confirms herders’ and farmers’ popular resentment that: ‘these days it rains less’ and/or ‘nowadays droughts occur more frequently’.
The last three decades
The period between 1946 and 1972 was apparently ‘wetter’ than the earlier 1918-1945 period (Figure 4.7). There was a decrease and a wide gap in rainfall amounts between the period 1945-1999 relative to the period ending 1972. These differences are also indicated by averages of 805 mm (first-1918-45), 890 mm (second-1946-72) and 726 mm (third-1973-99). This observation confirms the good decades of rain in the 1950s and 1960s. However, although the two-year moving average over the last 20 years indicates a downward trend in the total rainfall, the rainfall amounts do not differ significantly between these periods. The results also seem to suggest that Marsabit Mountain experienced relatively low rainfall amounts and thus became ‘drier’ over the last three decades compared to the two previous periods (despite upward trends being shown for other stations in northern Kenya). The last decade’s decrease in the amount of rainfall on the mountain is reflected by a leftward shift in cumulative frequency\(^8\) of total annual rainfall over the last 30 years relative to the two earlier periods (Figure 4.7; see also Figure 4.6).

Figure 4.7
Three decades of cumulative annual rainfall for Marsabit Mountain, 1918-2001

Note: For 1918 only 6 months of records exists and the annual rainfall was still higher than the 1919 one.

In this figure, the x-axis labels three-year coincidence, which allows us to assess changes in cumulative rainfall amounts. For example, 18-46-74 corresponds to 1918, 1946 and 1974, respectively. Starting from these benchmark years and until 1932-60-88, the cumulative rainfall graph shows similar trends. The graph clearly illustrates a shift in cumulative rainfall amounts between the selected periods, depicting a larger margin in the cumulative annual rainfall between the second and third period decades (i.e. 1946-73 vs. 1974-2001) compared to the first decade. This also suggests a reduction in the total rainfall during the third decade period. Viewed differently, the very comparable cumulative rainfall between the first and the

---

\(^8\) To obtain cumulative rainfall frequencies, we divided the data period into three equal parts. This division decision is arbitrary, but sufficiently demonstrates our concern about the temporal variability of rainfall.
third periods may reveal a cyclical rainfall pattern in the region. If the cyclical pattern of rainfall is a normal occurrence, it confirms the perception of the herding communities in the region of the cyclical and recurring peak years of high and below average rainfall (Robinson 1985; Tablino 1999).

To demonstrate this anew, let us further split the rainfall data into two periods only: from 1950 to 1974 as one period and from 1975 to 1999 as another. Let us again compare the long (March-May) and short (October-December) rainfalls during these periods to generate additional insights. The first period reveals 'first rainfall quartile' precipitation as being one and a half times as frequent as the later period, between 1975 and 1999. Conversely, the occurrence of 'second rainfall quartile' reveals precipitation that is twice as frequent for 1950-1974 as for the period 1975-1999. In addition to this and focusing on types of natural forests, low rainfall amounts of about 500 mm per year characterize tropical dry forests - a forest type that receives lower rainfall than the mountainous forests. Over the last 80 years, 22 years (27.2 per cent) experienced over 1000 mm of rainfall and for 11 years (13.6 per cent) annual rainfall amounts dropped below 500 mm. Of the latter years, eight occurred since 1973. This again indicates that the risk of adverse precipitation over the last three decades was twice as high as over the previous 50 years.

Thus, the analysis shows both increased risks of adverse precipitations and cyclical changes in the pattern of rainfall over time. The lower cumulative rainfall during the third-decade (i.e.1973-99) compared to former decades might have direct and practical relevance for how changes in rainfall patterns are to be perceived. Even if climatic variations are to be expected in the long term, the short-term effects of rainfall extremes still play an influential role on rural livelihoods, in terms of affecting capital and asset accumulations. As a backdrop, there may be a strong need to shift the current concern about long-term climate change to placing more of a focus on improved forecasting and effective responses to short-term shocks in the dry lands. In this regard, the fieldwork for the current study was carried out during one of the driest years ever recorded, namely 2000, and also one of the wettest years9, namely 1998. This particularly reflects two extremes in weather conditions which are nevertheless very close in terms of time. The coincidence of the current study's fieldwork surveys with these years provides ample opportunity to assess the effect of climatic shocks on production systems and human responses to such changes in their economic productions.

Probable effects of the rainfall patterns observed

One concern that arises from this result is the overall probable effect of the reduced annual rainfall on the production systems such as on livestock in the region10, the relation between rainfall and the availability of water resources in the region, forest ecosystem functions and arable farming on the mountain and more generally on rural livelihoods. In the recent past, the results showed a consistently increased risk of adverse precipitation (dramatic droughts) over the last two and a half decades. It would, therefore, be safe to infer that during the last couple of decades the low rainfall amounts have had a serious effect on crop production, livestock

9 Note that either the year 1997 or 1998 is indicated as one of the wettest years in Table 4.4 for Marsabit because the rains extended over two rainy seasons that are normally separated by a dry season (Jan-Feb.).

10 Although we also have rainfall data for Maikona and Korr in the lowlands, the period covered by the data is too short to allow any assessment of significant changes in rainfall amounts over time.
mortality\textsuperscript{11} and livelihood sources of human welfare. The revealed patterns of rainfall on the mountain and other rainfall stations also stress the likely distributional impact that precipitation bears across the region as a whole. One might even expect the effect of reduced precipitation to be more for those areas in the lowlands, which normally receive relatively low levels of precipitation and experience wider rainfall variability than the mountain area.

The decreasing rainfall pattern during the last decade suggests negative consequences for production in the region. These changes are indicative of vulnerability and uncertainty in production systems that are largely dependent on rainfall. Rain-fed agriculture on the mountain and rainfall linked rangeland resources such as water and pasture are examples of such production systems. For example, rainfall is the only source of recharging groundwater aquifers in the district through direct infiltration. The subsequently discussed decline in livestock per capita, below the mean minimum subsistence level (see the section on changes in livestock population), may perhaps relate to the rainfall regime shown. However, the effect of recent downward trends in rainfall might not be negative for all water demands. For example, recent rainfall might not adversely affect water availability in the short term as the stock of groundwater is still high, but it can have dire effects on crop production and on primary productivity of the rangelands.

Effects of the observed rainfall patterns on crop production

The question now is which mechanisms are used, by households and individuals alike, to adjust to the variability in actual production conditions. The present study explores this by assessing isolated periods of peak and moments of depressed production, and by investigating people's adaptive responses to such fluctuations. This approach may give insights into adjustment mechanisms during food shortages and leads the way to understanding some changes induced in the society, which may have emerged in response to such phenomena of variability in climatic factors.

A lot of studies have been carried out into rainfall and climate change relationships (Bake 1983; Mati 2000; Kipkorir 2002). The question of whether the climate is changing in African drylands is an important one. A serious drying up of the environmental resources could have an obvious effect on the pastoral predicament. Since pastoral productivity depends very heavily on rainfall, an elaborate study was carried out into rainfall trends (see section above), the links between these trends and fluctuations in livestock (Chapter 16) and the question of whether the decline in livestock numbers can be related to trends in rainfall. The trends in rainfall are also related to potential crop production.

Farmers are concerned about crop risks induced by insufficient rainfall. To grow cereal crops under rain-fed conditions in arid and semi-arid areas, one normally needs 100 mm of rains each month over a period of three consecutive months (Critchley & Siegert 1991; Mati 2000). Since arable production on the mountain relies heavily on rain, rainfall amounts, variability and crop water requirements are primary and influential constraints to crop production\textsuperscript{12}. This remark is valid for maize production, which is a staple food crop not only

\textsuperscript{11} In Chapter 16 we relate annual rainfall to livestock numbers. In addition, we also provide some figures on the impact of recent droughts on the livestock resources and an indication of drought mitigation and intervention costs.

\textsuperscript{12} Other factors such as temperature, day length, solar radiation and atmospheric humidity are also influential factors that affect crop production (see Mati 2000: 334).
for Marsabit, but also for over 90 per cent of Kenya’s population. Maize covers a larger area than other crops in Kenya and provides about 42 per cent of the dietary energy intake (*ibid.*). After maize, beans (*i.e.* dry beans) is the second most important crop on Marsabit Mt. It requires a total growing period of 90-120 days. Dry beans also require 100 mm of monthly rains for two months in a row, depending on climate\(^\text{13}\) (Critchley & Siegert 1991). If full crop water requirements per crop season are not met, the crop yields are affected and the probability of a crop harvest is slim or nil. That is to say, with other factors being constant, 100 mm of rain per month for three consecutive months is adequate for the production of maize and beans, 100 mm of rain per month for two months in a row jeopardises maize production, but is sufficient for beans. A crop season with only one month of 100 mm of rain imposes severe constraints on crop growth, making maize and bean harvests basically impossible.

On the basis of such crop water requirement guidelines, crop water requirements for successful growth and better yields require a different month-by-month diagnostic analysis of the rainfall on a crop season (bi-annual) basis than we have addressed so far. To illustrate this crop water requirement we examined the period from 1950 to 2001, which consists of 52 years or an equivalent of 104 crop seasons (Figure 4.8).

![Figure 4.8](image)

**Figure 4.8**
Number of months of 100 mm rain in a row, Marsabit station, 1950 - 2001

Notes:
- a. The year’s prescript of 1 stands for long (March-May) rains and 2 for short (October-Dec.) rains.
- b. On the y-axis the commas should be decimals.


The monthly rainfall data reveals only very few crop seasons for maize and even fewer years which fulfil the crop-rainfall requirement. As this figure demonstrates, 100 mm of monthly rain for three consecutive months and above occurred during only eleven crop seasons (out of a potential of 100 crop seasons), and only this monthly rainfall amount is potentially sufficient for good maize and beans harvests. During the same period there were

\(^{13}\) Factors such as the mean daily temperature, humidity, hours of sunshine and wind speed are all critical for bean production (Critchley & Siegert 1991) as well, but are ignored here.
35 crop seasons of 100 mm (or above) of rains for two consecutive months, which meets water requirements for dry beans only, but not for maize. The actual crop harvests over the periods, especially before the 1970s, are scarcely sufficient to compare yields however (see Chapter 12 for rainfall-crop harvest relationships).

What is more, splitting these decades into the 1950-75 and 1976-2001 periods shows that there is a high chance (of roughly 19 per cent) that crop seasons with complete water deficits (i.e. zeros) occurred during the latter period compared to the earlier one (12 per cent). This would not be beneficial anyway since neither maize nor bean yields are realisable. The 100 mm of monthly rains for only one month per season are distributed more or less evenly – with probabilities of about 39 per cent in the entire crop season. Thus, the prescribed three consecutive months of minimum maize water requirements occurred only a few times during the last 50 years, or so, in the area. During the earlier period the probability was higher (35 per cent) of 100 mm of monthly rains during at least two consecutive months per crop season in relation to the latter decades (26 per cent). Based on the crop water relationship, there is a high margin of 9 per cent chance of rainfall deficit to meet the water requirements for beans during the 1976-2001 period. This lower likelihood of 100 mm of monthly rain for two consecutive months during the latter decade is consistent with the lower cumulative annual rainfall described above and also echoes the apparently increased risk of precipitation on the mountain. By way of an illustration, a severe moisture stress during critical growth stages of crops, which substantially reduced crop yields by about 90 per cent on the mountain in 1997, was blamed on rainfall failure (MDAR 1998).

In the short term, the effect of low rainfall might be unfavourable not only for crops, but also for various other sectors of productions like rangeland and livestock produce. For instance, years with low rainfall amounts such as 1973, 1984, 1991, 1992, 1996 and more recently 2000, were all associated with total crop failure and/or caused large losses of livestock of up to 40 per cent (MDAR 1974; MoALD&M, GTZ/MDP&ALRMP 1998). Moreover, extremely high rainfall can cause losses. The exceptionally high levels of rainfall in the wet season of 1997/98 also boosted disease-causing vectors. This culminated in outbreaks of livestock diseases such as foot-and-mouth disease that caused a drastic increase in small stock mortality due to heavy rainfall (MoALD&M, GTZ/MDP&ALRMP 1998), human diseases (e.g. rift valley fever, malaria), stunted plant growth and an outbreak of crop diseases (e.g. worms) in the region. The net effect of the above-average 1997/98 rainfall shock was reduced crop yields (rotting of beans in the field), animal diseases (e.g. foot and mouth disease among small stock) and a decline in livestock production as well as a breakdown in transport networks and increases in the prices of marketed consumer goods. Indeed, despite plenty of rain often associated with times of plentiful food supplies, northern Kenya was on emergency relief food. Such relief handouts are generally not synonymous with rain, but with drought, as was the case during 2000. During the late 1990s, the number of food insecure households had substantially increased in the region (MDAR 2001). The most profound effects of unpredictable rainfall (i.e. resonating low and high peaks) in arid zones are associated with a decline in crop production and loss of livestock assets (Mboghoh 1997; Oba 2001). Apart from excessive rains and prolonged droughts, partial crop failure was also caused by other whims of nature like the crop diseases (worms) that accompanied 1997/98 heavy El Niño rains.
On other hand, rainfall amounts below the levels required for crop production and adequate rangeland productivity can potentially induce production shocks and damage rural livelihoods. For example, Mt Marsabit experienced a total of 190.5 mm and 148.2 mm of rainfall during the short-rains period of 1999 and 2000 respectively. The corresponding maize harvests were 2.8 tons in 1999 (90 kg per ha) and nil in 2000. Following this crop failure in 2000 more than 80 per cent of the households on the mountain received relief food for a couple of months (FHI relief issue, 2000). During July 2000 alone, about 30,500 people on the mountain received 8,420 bags of maize (50 kg each). The relief food figures show how a moderate fall in rainfall amounts by 42.3 mm spread over three months can potentially have a severe impact on crop production. The financial implication of crop failure is partially estimated at Ksh. 5.9 million. This estimate reveals the high price that has to be paid for vulnerability exposure induced by a trivial fall in amounts of rainfall. Thus, rural crop failure, which is partly blamed on poor rains, may have dire implications for the local economies and harm the food security situation for the majority of the rural population.

A note on the rainfall trends
The rainfall analysis emphasises the variation in rainfall pattern and decreased rainfall reliability for crop production on the mountain. The analysis fails, however, to indicate the importance of other factors (e.g. the distribution of rainfall) in influencing crop production. The analysis of annual cumulative rainfall and crop water requirement results reveals a convergence of evidence of decline in annual rainfall in recent decades. This is shown by downward trends in the cumulative annual rainfall during the last three decades and, in particular, in a series of severe droughts that occurred during the last decade. This clearly signals an increased rainfall risk factor for crop production and jeopardised rural livelihoods over this period. Furthermore, during the last decade or so (i.e. 1990-2001), in addition to there being five years of average rainfall amounts far below any recorded, included 1997/98 as one of the wettest years. The closeness in time of below average and far above average years of rainfall magnifies the extent of rainfall variability on the mountain. The moderately higher rainfall variability of 12 per cent during the latter decades compared to the earlier period (coefficients of variation of 48.9 per cent against 36.9 per cent) confirms this result. This observation emphasises recurring shock factors in a very short space of time. Moreover, their effects on the rural assets and their basis of livelihood are crucial to the present study.

The effects of climate on rainfall failure depend on the specific resource base in question, livestock, rangelands or crops. In this regard, the persistent droughts and episodes of other distress factors (e.g. diseases and excessive rain) in a very short time and their resultant effects on crop productions and rangelands (thus livestock assets) are of critical concern here (MoA&LD, GTZ/MDP & ALRMP 1998; UN-OCHA 2001). For instance, one may wish to know the magnitude of a shock factor on the herd mortality and the speed of herd recovery before another shock strikes (Oba 2001; Aklilu & Wekesa 2002). Alternatively, there is great

---

14 July is usually the end of the harvest season of the March to May crops, i.e. the long rains period.
15 We derive this estimate using the prevailing local Marsabit Market price of Ksh.14 for grain-maize during July 2000. The estimated amount is equivalent to about US$ 84,200, at Ksh. 70 to a dollar. The estimate does not include the market value of other relief supplies (e.g. pulses, oil), or other auxiliary costs (e.g. logistic and inland transport costs), which often form a parallel to distributions of relief food. If we also consider the entire district, the mitigation cost of vulnerability exposure is increased substantially.
concern when full crop water requirements are not met by the rainfall amounts and crop yields are greatly affected for a series of crop seasons. The recurrent shock factors such as droughts and El Niño rains may independently have less effect, but they may cumulatively have more profound impacts on economic production, especially when they occur within a very short time frame. More precisely, the outcome of such factors can have different adverse consequences for different households, but are bound to be more dramatic for the poorer segment of the population. The rate of recurrence and extent of shock factors on various resource bases calls for attention to be paid to immediate and medium-term responses to production failure and to prospects of strategic and contingency plan activities ahead of variable shocks. The crisis periods of the 1997/98 heavy El Niño rains and the 2000 post-El Niño droughts are of particular interest and will receive ample attention in this book.

Livestock

The pastoral groups in the district rear a diversity of animal species, such as cattle, camels, small stock (goats and sheep) and donkeys. The major food products gained from livestock are meat, milk, and occasionally blood, as well as hides and skins for other uses (MDDP 1994). These livestock outputs are often positively correlated with livestock populations. Therefore, absolute livestock numbers at district level may allow for the derivation of some measures of wealth levels and food security from the livestock sector. This means that high animal numbers at any given time are an indicator of higher livestock produce and products relative to the demand for food over time.

Population figures, whether relating to humans or livestock, are of crucial importance for resource allocation, and useful as well for policy-related issues and for assessing the resources needed to support the livestock economy. Such data is even more important in relation to the distribution of resources. Livestock and human population numbers are generally vital for examining the potential capability of a region to sustain itself, to assess demand levels to make sustainable utilisation of existing stocks of resources and for formulating a sound public policy. In particular, the link between population growth and livestock numbers will indicate the economic viability of the pastoral production system. The livestock population estimates for most years are based on the Kenya Rangeland Ecological Monitoring Unit (KREMU) aerial surveys, where such surveys existed, and annual estimates from the Ministry of Agriculture and Livestock Development reports (MDARs, various years). Before presenting this data in the following sections, in the following section we will first reflect on the reliability of livestock data in Kenya.

Because pastoral households keep diverse livestock species and vary in size, livestock wealth at household level is measured in per capita terms using a conversion scale that adjusts for the weight and size of animals. The commonly used measure for livestock in Africa is the Tropical Livestock Unit (TLU). The TLU is a standard measure used in the literature to convert different livestock species into equivalent units (Lusigi 1983; Schwartz & Walsh 1983).

---

16 This assumption rests on the premises that a conducive environment allows sound governance to ensure the equitable allocation of resources and political will to support such allocations. It is also the case that public policies have differentiated impacts on different groups.
1991). It is a ratio between one TLU equivalent to 250 kg live weight, and an average live weight (in kg) of the types and breeds of animal being considered. For example, a camel weighing 300 kg is equivalent to 1.2 TLU – 300 divided by 250 (see Lusigi 1983: 286 and O’Leary 1985 for livestock types and breeds found in Marsabit District). The TLU measure permits the aggregation and comparison of household livestock wealth across animal types (see Little 1983; Fratkin & Roth 1990; Zaal 1998), or an assessment of total forage requirements (and therefore maximum stocking density) (Sombroek et al. 1982; Schwartz & Walsh 1991; Toxopeus 1996). The standard measures for camels, cattle and small stock in Marsabit District are 1.2, 0.7 and 0.1, respectively (Lusigi 1983; O’Leary 1985; Fratkin et al. 1999; Fratkin & Roth 1990). In the literature on pastoralism, 4 TLU per person is recommended as a minimum livestock wealth to meet basic food requirements for subsistence (Dietz et al. 2001).

Reflection on the reliability of the livestock data

The changes in livestock populations and their products are sensitive to both external (natural) shocks and government policy environments. Prior to the 1960s, the colonial government viewed the large subsistence herds as causing widespread environmental degradation rather than supporting human well-being (Brown 1963; MDAR 1948; Kenny 1997). The post-independence Kenya government also inherited this negative perception of the livestock sector up to the early 1970s (Dietz 1987; Keya 1998; Nnonu 2000: 43). Until then, little reference was made to the contribution of the sector to the subsistence production and the wider economy. Moreover, until the early 1970s, there was little reporting of the pastoral livestock sector’s production in the official government documents and reports.

From the early 1970s through to the early 1990s the importance of the livestock sector was recognised in government policy decisions (cf. FAO 1971). In spite of this, the responsibility for the sector fell under only a small part of a much larger Ministry of Agriculture, Livestock Development and Marketing. During the years referred to, the Kenyan economy was relatively sound and there were sufficient resources to manage, supervise and report stocks of resources. From the late 1970s until the late 1980s the Kenyan government made a deliberate effort to tap the resource base of arid and semi-arid lands (MDDP 1979, 1989). This resulted in a ‘district focus’ in rural development programmes and the creation of a new Ministry of Reclamation and Development of Arid, Semi-Arid Areas and Wastelands in 1989 (see Nnonu 2000). This new ministry also took care of the inclusion of livestock resources in official documents, particularly at district level. This was not meant to last long. With the introduction of the multi-party system in 1991 and subsequent national elections in 1992, the Kenya economy started to decline. For example, the value of the Kenyan shilling depreciated considerably and inflation rates soared to unprecedented levels: from an annual inflation rate of about 8 per cent in 1973 to a staggering 28 per cent by 1992 (Oyug i et al. 1997). With the falling economic conditions, the activities of some government ministries were taken over by bilateral agencies (GTZ and expansion of the ASAL programmes, especially in the more arid districts which are home to many pastoralists and where large numbers of livestock

---

17 The Colonial Government did acknowledge the role of livestock in enabling the pastoral groups to pay the hut-tax and this was presumably one of the reasons for encouraging livestock marketing (cf. MDAR 1947: 11).
populations are found). Another example of such projects in Kenya is the Kenya/Netherlands ASAL programme in Kajiado and Laikipia Districts.

The economic deterioration was later met by nationwide mushrooming of activities by NGOs that stepped in to compensate for the failures of government ministries and the lack of public services. The government's inability to coordinate activities from the mid 1990s onwards brings to mind the question of credibility of record keeping of livestock resources. This was seriously limited by a lack of vehicles required to facilitate supervision and financial resources to cater for overhead costs and maintenance. In this light, we expect the reliability of the livestock records prior to the 1970s to be 'poor'; 'moderately good' between 1972 and the mid 1990s (FAO 1971, and annual reports, various years), and 'fair' from the mid 1990s to the present. This general assessment holds true for both the national and district level information. In the late 1990s, there are apparent inconsistencies in year-to-year district level reporting; hence the quality of information reporting could be much better.

At the moment, the Kenyan economy is suffering a further economic downturn and is facing a severe general fall in economic performance. With regard to the livestock sector, the institution of livestock marketing in Kenya and de facto monopolistic power were vested, prior to 1987, in the Kenya Meat Commission (KMC). This was closed down and that further weakened livestock marketing structures in the country. Those in charge of the economy have been under pressure from the World Bank and IMF to implement Structural Adjustment Programmes (SAPs) since 1996 (GoK/IMF 1996). They have so far failed to meet World Bank and IMF conditions for acquiring loans in order to finance nationwide economic activities and repay debts. This remains a stark choice for the economists, but the World Bank and IMF SAPs and stringent loan conditionality seem now to be the most influential economic policies that direct the future of the economy, on the whole, and the ASAL districts in particular. At best, there are a lot of economic uncertainties about the future pathway of the national economy. The poor economic performance seriously marginalises the ASAL regions.

The 'official' development policies pursued since colonial days to the present-day by the Kenyan government have had, and will continue to have, direct consequences for the livestock sector and the sector's contribution to the national economy (see Oba 1997: 41-51). The poor economic performance is likely to slow down the trends of economic globalisation and undermine the importance of the livestock sector.

---

18 The poor economic performance of the Kenyan economy has been widely reported in the literature (see Country Watch 2003; Ikiara, Daily Nation June 8, 2003; UNFPA 2002; IMF 1998, 2000; Devarajan et al. 2001; World Bank 1995a).
19 Efficient and reliable governance structures necessary for economic development are currently lacking in Kenya. Today, corruption is alarmingly high and is a chronic disincentive to foreign investments.
20 The aid conditionality by the IMF/World Bank was in fact high on the agenda of a recent regional conference on “Donor Lending Conditions in Africa” in Nairobi (see Mburu (2001), The East African, 29 October 2001). At the moment, following the recent Dec. 2002 General Elections in Kenya, positive changes seem to be taking place in government cycles. However, things are still in an infancy stage and it is rather premature to make affirmative remarks in terms of international images and flow of donor funds.
21 To date, the livestock sector was excluded from poverty reduction targets focused on agriculture (Kimenyi 2002). Yet the role of livestock with regard to the livelihoods of the poor, who live mainly in the rural areas, and to rural income is critical to poverty alleviation (Livestock in Development 1999). It might even be important to focus on improving the livestock sector for the sake of the rural poor rather than attempting to raise the contribution of livestock sector's shares in GDP.
In as much as the district level livestock data provides an invaluable benchmark for a thorough understanding of the performance of the livestock economies, an inquiry into household scenarios provides new insights into the contribution of the livestock sector to human welfare and pastoral household needs. Such scenarios at household level will be dealt with in the chapter on the animal trust system.

The data on yearly livestock and related resources for Kenya as used in this chapter have been obtained from the FAOSTAT database. FAO uses the Kenya Central Bureau of Statistics (CBS 2000) to gather and compile data. The reliability of the various data may be questioned, but the FAOSTAT database is the single most comprehensive available source of data. Although it may be claimed that this source has been used due to the lack of data from alternative sources, the CBS is the most authoritative department in charge of statistics in Kenya.

The state of the livestock sector prior to the 1960s
To acquire a better understanding of recent livestock numbers of the pastoral groups in the region, it is worthwhile reflecting on their livestock assets in the past. In the district's numerous annual reports, links between human and livestock population figures are hard to find. As a consequence, a vigorous investigation of the status of the pastoral wealth in the region is not possible because of an almost total lack of data.

However, to shed light on the past pastoral wealth in the region, the Gabra and Rendille human populations were estimated in 1932 at 5,662 and 3,706 persons respectively (MDAR 1932). That same year, their livestock populations were estimated at 84,048.2 TLU (equivalent to 14.84 TLU/person) for the Gabra, and 106,118.3 TLU (equivalent to 28.63 TLU/person) for the Rendille. This reveals average livestock levels far above the sufficiency level for individual food requirements. In support of this, Baxter (1990), reflecting on the 1950s and talking about the Boran groups in northern Kenya, observes that:

"At that time the Boran were prosperous, self-sufficient pastoralists who subsisted almost entirely on the milk, blood and meat which their herds supplied; they sold sheep (and occasionally a bullock) to pay [hut]-tax and fines levied for breaches of grazing regulations, to purchase cloth, blankets, ... and supplementary foodstuffs such as sugar, tea, ... and maize meal to vary their diet, and coffee beans for their spiritual and social comfort (Baxter 1990: 247)."

This comment also corresponds with our expectation about the state of pastoral wealth in the region, especially during the period preceding the 1960s. However, there is evidence of a considerable decline in livestock wealth in the recent past, for a number of reasons. Today, the herding communities are much poorer than they were during the English colonial years. To put things in perspective, O'Leary (1990) records average herd wealth of mobile Gabra and Rendille people at 6.3 TLU per capita and 6.9 TLU per capita respectively, while the average wealth of settled Rendille households was 6.5 TLU per capita. This gives an overall mean household wealth of 6.7 TLU per capita for the Rendille population. The rainfall data shows that the amount of rainfall was between 600-650 mm in 1932 and 1985 (and also in the

---

22 O'Leary's herd size estimates are for 1985 and were based on household data for previous years (see O'Leary 1985). The Rendille human population was estimated at 3,706 in 1932 (Sharpe 1932: 37a (276), and O'Leary (1990: 76) puts this at 7,074. We have adopted the former.
previous years 1931 and 1984) meaning comparable drought conditions. This allows for herd sizes comparisons during these years. Thus, between 1932 and 1985 the households’ livestock wealth decreased at an annual rate of 1.6 per cent for the Gabra and 2.8 per cent for the Rendille in TLU per capita terms. These figures also show that an average Rendille was almost twice as wealthy as an average Gabra in 1932 although they were only equally wealthy by 1985 in terms of TLU per capita. This means that an average Gabra nomad was more than twice worse-off and a Rendille more than four times worse off in 1985 than their ancestors in 1932. The apparent fall in the livestock wealth levels raises problems of immediate concern for the herding households in the area and also has implications for the development of the livestock sector in the future. The current study seeks to investigate people’s responses to such problems of loss of livestock assets.

Changes in livestock numbers at Marsabit District level since the 1960s

The changes in livestock numbers over time are important for an understanding of the performance of the livestock sector as well as of their contributions towards the welfare of pastoral households. Fluctuations in livestock populations at district level are steered by domestic slaughters, export\(^{23}\) outside the district (sales), births, deaths, loss of livestock to wildlife predators, inter-ethnic and across-border raids and skirmishes leading to livestock losses affecting a specific group or country, the outbreak of diseases and livestock migration outside the district. There are hardly records on some of these variables and data is therefore not available. In instances in which data does exist, there are huge deficiencies over the years (for example see Sobania 1979; Chabari & Njiru 1991; and MDARs 1990s). Such gaps in the dataset are a reason to doubt the reliability of the statistics provided and the policy reports based on them. Nevertheless, such reports provide a good enough substitute in place of no data at all.

---

23 A government ban or imposition of quarantine on livestock movements undermines pastoral animal sales. By way of a contrast, government policy on livestock price incentives and the provision of infrastructure and related services would stimulate animal sales. In this context, we acknowledge the role of government policy decisions and interventions in influencing livestock marketing behaviour and concomitant sales.
The main livestock types in Marsabit District are cattle, goats, sheep, camels and donkeys. Figure 4.9 indicates trends in small stock, cattle and camel populations over the last four decades. The figure reveals trend fluctuations in cattle, small stock and camel numbers. As the graph shows, both cattle, camel and small stock numbers were all lower in 2001 than in 1977.

Until 1968, livestock population estimates for Marsabit and Isiolo Districts were combined into one number in the reports, meaning the figures for Marsabit District alone for 1963/64 can be regarded as being less than stated above. Between 1977 and 2000, small stock and cattle populations recover somewhat and then gradually decline. Tracing out a broader picture of these changes reveals an annual decrease of 5.4 per cent in cattle populations (395,000 in 1977 to 115,000 head of cattle in 2000), an annual decrease of about 2 per cent for small stock (from 928,000 to 610,000) and an average decline of about 3 per cent per year for camels (a drop from 134,000 to 68,000). The downward trends in livestock population numbers have been gradual over time, however, as well as sensitive to reference years.

The period between 1963 and 1975 does not show any reliable trend in livestock population (Figure 4.9), since data for these years is largely missing. However, some of the low figures might be due to the effects of 1968/69 droughts. In support of this remark, it was estimated that 20-30 per cent of all cattle in Marsabit District died during the drought between 1969 and 1971 (Lusigi 1983). From 1977 to 2000, the three types of livestock populations showed comparable dynamics. The only exception is a different dynamic pattern in the small stock population from cattle and camels between 1993 and 1996. The sharp rise in livestock populations in 1976-1977 may be attributed to the improved collection of livestock information rather than to a natural animal growth in the region. Again, our guess is that these remarkably high increases in livestock numbers follow from government recognition of the importance of the livestock sector as from the early 1970s (see FAO 1971).

The dynamics in livestock trends may be due to all manner of causes, such as improved counting techniques, changes in policy, climatic change, migration of herds to other districts and a diversifying economy. We will first deal with policy-related issues. Climatic change as the possible underlying reason for the dynamics in livestock trends will be dealt with in Chapter 16.

There is a background story to the prejudices concerning the livestock sector at national level. In the pre-independence era, the colonial government generally attached low development priorities to the livestock sector. On the contrary, they regarded the large number of livestock kept at the time by the pastoral groups as being responsible for the deterioration in the environmental conditions of the rangelands in ASAL regions (Brown 1963; Lamprey & Yusuf 1981). This colonial legacy regarding the livestock economy and its development policies was inherited by post-independent Kenya. As a result, the Kenyan government failed to recognise the main economic contributions and the forward linkages of the livestock resources, especially of the subsistence sector to the national economy. Both the colonial officials and later the Kenya Government implemented favourable policies in order

---

Note: Small stock denotes combined population estimates of sheep and goats in Marsabit District.

Source: Composed from data from the Marsabit annual reports and Development Plans, various years.

---

24 For this reason 1977 is a better base year to take as a reference.
to harness farming (crops) resources until the 1970s. These unfavourable government feelings were to change around the early 1970s. In particular at international level, the Food and Agricultural Organisation of the United Nations took a leading role in emphasising the importance of livestock production and its contribution to the national economy in official government documents. In support of this observation, FAO (1971) conducted and published a comprehensive survey report on range resources and development potentials in Marsabit District for the Kenya Government. Subsequently, the MDDP of 1979/83 provided unusually detailed information on the region’s resources compared to previous development plans. It particularly provided year-to-year information on livestock population figures, slaughter data, export numbers and their export values from 1972 to 1977 (Marsabit Development Plan, 1979/83). This successfully contributed to a shift in government policy regarding the subsistence livestock economy as opposed to the old development bias that was much more in favour of arable farming. As a result, the 1979-1983 Development Plan articulated an urgent need to develop arid and semi-arid lands through options that make more efficient and productive use of the arid and semi-arid environments without jeopardising their fragile ecology (ibid.)

The district livestock once again reduced considerably in numbers in 1983/84, owing to a severe drought in northern Kenya. During this period, the district suffered livestock losses of about 40 per cent of cattle, 20 per cent of small stock and 10 per cent of the camel populations. The population later shows a gradual recovery with an annual growth rate of about 6 per cent for cattle, 7 per cent for small stock and 3 per cent for camels from 1985 to 1991. From 1995 onwards, the small stock population indicates a decline in population. After 1991, despite cattle and camel numbers being the main determinant of subsistence production and households’ food security, the decline in populations continued.

Northern Kenya experienced extensive droughts between 1969 and 1971 (Robinson 1985), and recurrent droughts in 1968, 1971-73, 1979-81, 1983-84, 1991-92, 1996-97 and the recent 1999/2001 post El Niño droughts (UN-OCHA 2001). In general, the outburst and downward oscillation of the herd populations can partly be traced to both good years of rains and bad years of droughts. For instance, the years 1968-71, 1976, 1983-84, 1991-92 and 1996-97, when animal populations showed downward trends, were bad drought years in the district. The drought of 1983/84, in particular, reduced the district livestock populations by about 40 per cent (MDAR 1985). In contrast, the years 1977-78, 1981/82, 1988/89 and 1994/95, were good rain years in the district, in which animal populations and livestock showed an increase in numbers (MDARs, various years; Robinson, 1985; and see also the rainfall figures presented earlier in this chapter).

26 The 1983/84 droughts are remembered worldwide particularly for the serious famine situation in Ethiopia that occurred in this period.
27 During this period the pastoralists in the region suffered livestock losses ranging between 25 and 75 per cent of their herd holdings (see Hogg 1986). This is very comparable to our estimates of animal losses in the district.
28 Good years of rains are often (though not necessarily) accompanied by favourable range conditions and animal health. The years of good rains are also favourable for disease-causing vectors, which might negatively impact on animal health and in turn reduce herd growth.
Droughts are usually associated with the loss of thousands of animals, whereas good years of rains often provide enabling range conditions for herd growth through better herd recruitments (or recovery). In addition, the low animal populations as from the mid 1990s could partly be due to Moyale becoming an independent district, separate from Marsabit District, in 1995 and partly by both the 1996-97 drought, the effects of the recent excessive rains of 1997-98 and the recent post El Niño drought. The effects of these phenomena are clear features among all animal types in the region. Since the 1996-97 drought the recovery process of all the livestock types is still incomplete and ongoing. However, the decrease in camel numbers between 1997 and 1998 was due to their migration to Wajir and Moyale in a bid to escape from the drought in the district. The low growth in cattle and camel numbers is bound to affect the overall tropical livestock units in the district, as these animals are assigned higher conversion factors as compared to small stock.

Livestock population trends in absolute and per capita TLU measures in Marsabit district since the 1960s

In this section we examine trends in livestock numbers, expressed both in absolute numbers and in TLU values per capita in Marsabit District during the last 40 years. The livestock TLU measure in absolute terms and per capita gives an idea of joint livestock wealth and livestock holdings per person respectively. The sharp rise of the TLU measure of 1976-1977 (Figure 4.10) may be due to improved estimates of the livestock wealth in the region. As explained above, the government failed to recognise the contribution of the livestock sector to the national economy and human welfare before this time (FAO 1971). Taking 1977 as the reference year, the district TLU wealth fell substantially by almost 61 per cent between 1977 and 2000 in absolute terms, at a constant rate of about -4 per cent per year. The TLU measures, in general, show very similar trends over the years. The years when Marsabit experienced severe droughts are marked by lower TLU values such as during 1980/81, 1983/84, 1991/92 and the recent 1999/2001 droughts, while the years of good rains show an upward trend in TLU values. Moreover, livestock wealth in the district continued to decline during the past decade. The lowest animal wealth status ever in the region was recorded during the last five years. There is compelling evidence that the region’s herds have been badly hit by severe droughts in the recent past that have seriously impeded herd recovery.

The TLU per capita measure gives an idea of the critical level of livestock necessary to provide adequate nutrition to an individual from herds. In this regard, a TLU of about 4 per capita is considered as the minimum livestock value that can support an individual in terms of nutritional (caloric) food requirements (cf. Dietz & Salih 1997: 29; Fratkin & Roth 1990). Overall, the TLU per capita figures show a gradual downward trend since 1977. The TLU per capita values are less than 4.5 TLU wealth since 199129 and a further continued TLU per capita fall of less than 3 since 1993, except for 1995. This is an indication of the fading importance of the livestock sector in supporting subsistence production requirement of the largely pastoral population in the district. What these results make clear is that the last decade has brought yet another moment of uncertainty for pastoralists and the inability of the pastoral

29 The district had also a TLU per capita level of less than 4.5 in 1976, 1984 and in 1985. This slightly improved for a short while thereafter until 1991. The warning bell as signalling the viability of the pastoral groups in the region was, therefore, already being rung by the 1983-84 severe droughts.
households to derive their basic food requirements from their own herds. These results might at first be considered with some reservations, however. For example, we use total human populations in the district to derive the TLU per capita measure, while about 20 per cent of the district population (at least on average) subsists for some parts of the year on arable production and manufactured food materials. However, if we assume that 80 per cent of the total district’s population derive a large percentage of their earnings from the livestock sector, and use that proportion to calculate the TLU per capita, the estimates improve only marginally to about 3 TLU between 1995 and 1997 (i.e. 3.84; 3.6 and 3.0 TLU, respectively). This indicates a slight change in the TLU per capita values compared with the values that result when the total population is used as a basis for calculation. Using the same proportion of 80 per cent to calculate the growth of the pastoral population results in an average growth rate of 2.5 per cent per year for the Moyale population between 1990 and 2001, which implies that the livestock TLU per capita drastically declined at a continuous rate of 8 per cent per year (i.e. from 5.17 TLU/person in 1990 to 2.32 TLU/person in 1999) since 1990. These rates show a higher decline in per capita livestock during the last decade compared to the human population.

Figure 4.10
TLU measures for Marsabit District, 1963/64, 70, 72 and 1976-2001

Notes:

a. DistTLUpercap stands for district livestock per person (per capita).
b. DistTLU for Marsabid District absolute TLU measure.
c. The TLU per capita after 1994 adjusted for Moyale population, since it was split from Marsabit in 1995.
Source: Composed from data from the Marsabit annual reports and Development Plans, various years.

Three pertinent observations come to mind from the changes in the TLU per capita measures and the human population. First, the disproportionately higher decline in the TLU terms arises from a more rapid decline in livestock resources (and thus the TLU per capita measure) rather than being attributable to a sheer outstripping of growth in human populations in the course of time. There is evidently a clear problem of a dwindling resource base in relation to population growth. Secondly, it is unclear from this result whether the decline of TLU per capita is a consequence or not of livestock-induced ecological stress on the
rangelands, in accordance with the ‘tragedy of the commons’. Thirdly, these results indicate that the pastoral livestock economy in the region is at a crossroads. The decline in the TLU per capita below the critical livestock assets level confronts the pastoral households with a range of risks of livelihoods and food insecurity. This will, in turn, certainly have profound implications for the pastoral households’ food security and critical implications for government policy decisions.

Other natural capital

*Soil and vegetation characteristics*

The vegetation type in the district greatly varies across the agro-ecological zones, ranging from bare deserts devoid of any vegetation cover to scrub vegetation and to mountainous evergreen forests in the high altitude areas like Kulal and Marsabit Mts. (GoK1991a). Overall, three factors – namely, soil types, altitude and rainfall – are responsible for vegetation cover in the district. While, for the most part, soils are poor, shallow, sandy, saline and often stony in the vast low-lying plains (the low altitude areas), higher relief areas have good soils (mainly volcanic) suitable for arable farming with enough rain, or normal water supply and have richer species diversity.

The four main agro-ecological zones of the district range from sub-humid to very arid conditions (MDDP 1984; 1989, 1993, see also Figure 4.10). These zones are classified on the basis of specific resource (vegetation) endowments, activities they support and their stipulated ecological productivity (MDDP 1984: 3-5, 1994; see Fratkin 1998: 70-71 for some descriptions of the zones). The two main categories of these ecological zones are the highland and the lowland areas. This means that the different ecological conditions and vegetation types, resulting from the environmental parameters, determine to a large extent the various means of production that are possible in an area. The different agro-ecological conditions determine which different resources are present in a region and influence how people adapt to this environment. Additionally, the different ecological zones are associated with varying degrees of production risks due to lack of sufficient amounts and reliability of rainfall. It is of interest to the study to understand how resource tenure and access rights between different ecological conditions and ethnic groups may, amongst other factors, vary or be linked to human adjustment to changing circumstances over time.

*Forest resources and protected areas*

Of the total district area of 69,340 km², 13,807 km² (about 20 per cent) has been set aside for the conservation of nature, namely the National Parks and the Reserves (Schwartz *et al.* 1991; MDAR 2001). These include Sibilo National Park (1,000 km² and established in 1975) on the eastern shore of Lake Turkana, Losai Game Reserve (1,807 km² and established in 1976) to the south of Marsabit Mountain (MDDP 1979) and Marsabit National Park and Reserve (2,088 km²). Whilst these are the main areas in the district that have been set aside for nature conservation, our study focuses on Marsabit National Park and Forest Reserve around Marsabit Mountain.

The Marsabit National Reserve, which also includes Marsabit Forest Reserve and the National Park around Marsabit Mountain, lies at about 38° 02’ East and latitudes 2° 20’ North
The mountain area was designated a protected area in 1902. The forest, with an area of 15,292.8 ha, was gazetted as a Reserve in 1932\(^\text{30}\) (Marsabit Development Plan, 1974; Sobania 1979: 205). Of all the protected areas in the district, about 153 km\(^2\) is Marsabit Forest Reserve while an area of about 360 km\(^2\) (including the 80 km\(^2\) of the Forest Reserve) is managed under a national park status (Litoroh et al. 1994: 2). The present-day border of the forest reserve was established in 1960 for the purpose of protecting and conserving biological diversity. The reserve is rich in bird species, has numerous indigenous tree species and is home to a wide range of wildlife (Adano 1999; MDDP 1979). These species form the basis of concern for conservation goals.

In Chapter 13 we examine how local communities make use of the forest resources and what the implications are of such uses for their well-being and the conservation of protected resources. This is of importance because the Marsabit forest performs several ecological and production functions and provides useful products to the local communities. With regard to the ecological functions, the forest ecosystem enables a favourable climate and ecology for farming and it is responsible for recharging subsurface and surface water systems (either through underground linkages or surface water run-offs in the lagas) to the surrounding lowlands. The forest also indirectly serves as a watershed (source of water supplies for wildlife, domestic use and livestock), provides habitat for wildlife and prevents soil erosion while indirectly supporting agricultural activities. These functions support the economies of both agro-pastoral communities in the mountains and the pastoral population in the lowlands\(^\text{31}\) (see Chapter 13).

As regards the production function, the forest directly provides timber poles used in the construction industry and houses, fuel wood and wood for many other 'minor' products such as farm implements and domestic tools. These functions are basically direct (economic) use values.

The often illegal harvest behaviour of protected area resources by households is not reflected in the official use of forest products. This problem raises main concerns over unsustainable use of reserve resources and conservation of the forest ecosystem. We make special reference to the nature of the local use of the forest resources and also examine the implications of such uses for the conservation of biological resources.

In addition, we examine the causes and consequences of local peoples’ use of protected resources. This study further seeks to make policy recommendations, on the basis of households’ use of resources, for the conservation of diversity of the forest ecosystem. On the basis of the study’s results some suggestions are put forward on policy guidelines that might influence policy decisions as to the effects of direct uses of the reserve for the local and the wider regional functions.

\(^{30}\) There is confusion as to the exact year in which the area was gazetted. While the World Resource Institute (WRI) and the World Conservation Monitoring Centre’s list of protected areas state 1949 as the year of the establishment of the reserve, Sobania (1979: 205) records this as 1927. The Forest Reserve was gazetted in 1932 (after the cancellation of initial gazettment effort of 1927) and the National Reserve enlisted under IUCN management categories areas in 1949.

\(^{31}\) In particular this function provides an external benefit for the forest ecosystem and other aspects of the mountain ecology. Put differently, the effects of forest destruction would affect the livelihood of the people on the mountain, and in the lowlands as well (i.e. reciprocal externality).
Human capital

Population figures
Kenya is divided into administrative units of provinces, districts, divisions, locations and sub-locations in that hierarchical order. The province is the largest administrative unit and the sub-location the smallest. These classifications are usually the basis on which human populations are enumerated and the basis of government allocation of public utilities and social amenities. Below we illustrate the trend in human population figures at district, division and location levels. The district’s human population figures can be obtained from National Population Censuses of 1948, 1962, 1969, 1979, 1989 and 1999. However, a straightforward comparison of changes in the population of different locations and divisions over time is rendered problematic by the notorious, and politically driven, splitting of administrative areas in the district. For example, in the 1962 census Moyale and Marsabit were treated as separate districts. Later they were treated as one unit and a few years later they were again treated separately. Nevertheless, it is still generally possible to get an idea of the changes in the human population at the district and divisional levels (Table 4.5).

<table>
<thead>
<tr>
<th>Table 4.5</th>
</tr>
</thead>
</table>

Human populations in the district by divisions and locations, 1962-1999

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Marsabit District</td>
<td>51,581</td>
<td>96,216</td>
<td>129,262</td>
<td>174,957</td>
<td>(40,308)</td>
<td>3</td>
</tr>
<tr>
<td>Marsabit Mountain</td>
<td>6,635</td>
<td>17,268</td>
<td>30,685</td>
<td>37,445</td>
<td>(8,344)</td>
<td>6</td>
</tr>
<tr>
<td>Mountain Loc.</td>
<td>6,635</td>
<td>14,781</td>
<td>25,363</td>
<td>30,094</td>
<td>(6,743)</td>
<td>5</td>
</tr>
<tr>
<td>Karare</td>
<td>--</td>
<td>2,487</td>
<td>5,322</td>
<td>(1,311)</td>
<td>7,351</td>
<td>(1,601)</td>
</tr>
<tr>
<td>North-Horr Div.</td>
<td>18,363</td>
<td>24,184</td>
<td>32,840</td>
<td>43,057</td>
<td>(11,013)</td>
<td>3</td>
</tr>
<tr>
<td>North Horr Loc.</td>
<td>12,297</td>
<td>16,612</td>
<td>18,122</td>
<td>23,539</td>
<td>(6,097)</td>
<td>1</td>
</tr>
<tr>
<td>Maikona Loc.</td>
<td>6,066</td>
<td>7,572</td>
<td>14,718</td>
<td>19,518</td>
<td>(4,916)</td>
<td>7</td>
</tr>
<tr>
<td>Laisamis Div.</td>
<td>18,777</td>
<td>24,143</td>
<td>28,587</td>
<td>40,976</td>
<td>(10,643)</td>
<td>2</td>
</tr>
<tr>
<td>Laisamis Locat.</td>
<td>13,301</td>
<td>14,647</td>
<td>16,032</td>
<td>24,011</td>
<td>(6,482)</td>
<td>1</td>
</tr>
<tr>
<td>Loiyangalani Loc.</td>
<td>5,476</td>
<td>9,496</td>
<td>12,555</td>
<td>16,965</td>
<td>(4,161)</td>
<td>3</td>
</tr>
</tbody>
</table>

Notes.

a. The figures in brackets refer to the number of households at the respective levels.
b. Figures in the last two columns are annual inter-censal growth rates (%) and are all rounded off to whole numbers.

The figures between brackets is the growth rate for Marsabit alone, when the 1989 population is adjusted for Moyale.


The last five Kenya’s Population Censuses were carried out in 1962, 1969, 1979, 1989 and 1999. The census figures show that the district’s human population almost doubled between

---

32 In 1962, the district had a population of 29,147 people, including the current Moyale District. The 1999 human population in Moyale District is included in those of Marsabit for the purpose of comparison.
33 A number of administrative changes took place between 1989 and 1999. Today, Moyale is a separate district, and centres earlier indicated as locations had become divisions (see GoK 2001a). In this table we use the former classification (as at 1989) to allow comparisons over time.
34 In terms of coverage and counting of household members in the country, these censuses were also considered the most comprehensive ones when compared to the only census carried out previously in 1948.
1969 and 1979 (Kenya Population Census, 1969; 1979). The significant difference in these census figures can be attributed to reasons such as probable under-counting and over-counting during both censuses as well as to immigration into the district (Daystar Communications 1982a,b &c). In the later 1989 Census, the district registered a total population of 129,262 people which means an annual population growth rate of 4.6 per cent between 1969 and 1989 and almost 3 per cent between 1979 and 1989. The district maintained a growth rate of 3 per cent between 1989 and 1999. The district population is, however, unevenly distributed in the district, as shown by population growth rate differentials across the divisions and locations. Large concentrations of human population are located around the district’s urban and rural centres (see Table 4.5). This is especially true in Marsabit town. Over the period between 1969 and 1989, when the district population almost doubled, that of the Marsabit Mountain (also called ‘the mountain area’) increased in absolute numbers by nearly five times. Between 1979 and 1989, the population on the mountain grew at an annual rate of about 6 per cent. Surprisingly, the mountain area had the lowest inter-censal population growth rate between 1989 and 1999 when weighed against the other administrative units. However, it is also possible that the area within Marsabit township boundaries is saturated which might partly account for the slow growth rate.

Contrasting the 1979-89 and 1989-99 inter-censal growth rates, Moyale shows a more proportionate population growth rate in comparison to the mountain. This differential growth rates may suggest migration reversal from the mountain towards Moyale. A probable reason for this change is the increasing importance of cross-border trade with Ethiopia. In contrast to the isolated nature of Marsabit Mountain, Moyale offers better opportunities for trade in Kenyan products such as, notably, plastic containers, washing detergents (e.g. bars of soaps and Omo) and cattle. While the differences in population growth rates between Moyale and the mountain were a revelation to us, if the posited migration-reversal is accepted, there has been a shift towards trade vis-à-vis arable farming on the mountain.

Although, the mountain area no longer had one of the highest annual population growth rates between 1989 and 1999, it had the highest population densities in the region (GoK 1994a). The population growth on the mountain indicates a sedentarisation process among nomadic pastoralists and will inevitably have consequences for the natural resource base. We believe that the process of pastoral settlement in the region has consequences for the use of environmental resources in a low resilient environment. The scarce water resources in the area

---

A few earlier censuses were conducted for the ethnic groups in the current Marsabit District. The earlier censuses were based on different enumeration units and are difficult to compare with the later census figures.

Although the population figures of this year's census are available, their direct comparison with other later censuses is made difficult by boundary changes and the use of different names for locations in the later censuses.

During the 1999 Population and Housing Census, Marsabit District alone had a total population of 121,478 people and 30,000 households (GoK 2001a). In the previous 1989 census, Marsabit alone had a total population of 92,112 people and 21,539 households, adjusted for Moyale (sub) District (GoK 1994a). Based on this data, the district realised an inter-censal population growth rate of 2.7% and 3.3% in the number of households, annually.

Trade in turn generates revenue for the county council. Since the separation of Moyale District, it is commonly stated that Marsabit County Council has become financially very poor: the low generation of revenue has led to a decline in social services and the irregular payment of its workers (we witnessed this first hand because our accumulated plot rent was used immediately to pay council workers' dues).
seem to be coming under increasing pressure. In addition, the currently protected forest area will need extra conservation efforts in the wake of increased use. Changing food habits resulting in a higher demand of fuel for food preparation and the increased demand for wood for construction purposes are, among other threats, serious points of concern which are focused on in the later chapters of this book.

*The ethnic groups in Marsabit District*

There are many ethnic groups in the district and trends in their populations are shown below. The Boran, Gabra, Rendille and Samburu are the main (pastoral) groups (see Table 4.6). Traditionally, the Rendille are camel-herders and the Samburu are cattle-keepers. The interspersed migration and close alliance between the two groups has allowed them to share ecological or range resources, as well as borrow considerably from each other’s traditional ceremonies, (social) values and exchange each other’s economic means of production. Today, the Rendille and Samburu have comparable camel and cattle populations (see Chapter 7). There is a substantial process of borrowing and adaptation, intermarriage and blending of culture between the groups. The cross-border movement of individuals and families to and from one group to the other means their ethnic identity is fluid and dynamic, as well as vividly prevalent in the region (Spencer 1973; Schlee 1989; Falkenstein 1998). In particular, Ariaal emerged as a result of alliance, intermarriage and blending between camel-herding Rendille and cattle-keeping Samburu (Spencer 1973; Fratkin 1991; see also Chapter 1). Intermarriage and the exchange of animals has also taken place between cattle keeping Boran and camel keeping Gabra.39

The pastoral groups in the district are also found in other districts and regions of the country (Table 4.6). The majority of the Boran, for example, live in southern Ethiopia and in Moyale District. They now constitute the largest single group inhabiting Marsabit Mountain. They first migrated into Kenya as a result of oppression and attacks by soldiers of Menelik II in the last part of the 19th century (Sobania, 1979; Daystar Communications, 1982b) and a sizeable number of them live in Isiolo District. Many of them also arrived during the first part of the 20th century to escape the harsh military forces in Ethiopia, while many more fled the military conscription later.

The Rendille mostly live in the south-western part of Marsabit District. The Gabra mostly live in the northern and north-western parts and a few live in southern Ethiopia. Many of the Samburu live in Samburu District of Rift Valley Province and a smaller number live intermingled and in a very close alliance with the Rendille in the south-western section of Marsabit District and the southern part of the mountain (GoK 1989, 1994a). Surprisingly, Turkana is another important group, as shown by the 1989 Census, where they make up even more of the district’s population than the Samburu. The substantial differences in proportions of Somali in the district’s population in 1979 (7.6 per cent) and in 1989 (0.9 per

38 Schlee (1989) gives an excellent account of the dynamics of identity between the different ethnic groups in the region, in what he terms a Proto-Rendille-Somali (PRS) culture (see also Tablino 1999). This revelation touches primarily on shifting identity on the move, thus the title of his book, within the pastoral groups.

39 As we mentioned earlier, ethnic groups have no clear boundaries and individuals can have dual ethnic identities. We treat ethnic identities as flexible social constructs which are dynamic in time and space.

40 Turkana inhabit their own village, manyatta Turkana, around Milima tatu (three-hills) on the mountain. However, they do not form the main focus of the current study.
cent) could be due to the group having been split into various sub-clans in the 1989 census. The rest of the Somali sub-clans were included in ‘others’, whose share rose from about 9 per cent in 1979 to almost 15 per cent in 1989.

Table 4.6
Population of the district by the main ethnic groups (%), 1948-1989

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Boran</td>
<td>2,893</td>
<td>3,283(11.3)</td>
<td>13,432(26.0)</td>
<td>27,694(28.8)</td>
<td>36,447(28.2)</td>
</tr>
<tr>
<td>Gabra</td>
<td>12,123</td>
<td>10,734 (36.9)</td>
<td>15,890 (30.8)</td>
<td>23,410 (24.3)</td>
<td>30,213 (23.4)</td>
</tr>
<tr>
<td>Rendille</td>
<td>15,739</td>
<td>13,638 (46.9)</td>
<td>17,686 (34.3)</td>
<td>19,856 (20.6)</td>
<td>23,585 (18.3)</td>
</tr>
<tr>
<td>Turkana</td>
<td>--</td>
<td>129 (0.4)</td>
<td>1,036 (2.0)</td>
<td>2,929 (3.0)</td>
<td>7,343 (5.7)</td>
</tr>
<tr>
<td>Samburu</td>
<td>--</td>
<td>36 (0.1)</td>
<td>901 (1.7)</td>
<td>3,990 (4.1)</td>
<td>5,887 (4.6)</td>
</tr>
<tr>
<td>Somali</td>
<td>--</td>
<td>277 (0.9)</td>
<td>395 (0.7)</td>
<td>7,080 (7.6)</td>
<td>1,148 (0.9)</td>
</tr>
<tr>
<td>Burji</td>
<td>412</td>
<td>--</td>
<td>--</td>
<td>2,750 (2.9)</td>
<td>5,623 (4.4)</td>
</tr>
<tr>
<td>Others*</td>
<td>639</td>
<td>1050 (3.5)</td>
<td>2,241 (4.3)</td>
<td>8,507 (8.8)</td>
<td>19,016 (14.7)</td>
</tr>
</tbody>
</table>

Note:

a. The Burji were referred to as Boran in the 1979 census (see Daystar report, 1982b:84), and we obtained data on their population by taking the mean of their ‘conservative estimates’ (ibid.p.85).


The Burji is another important group on the mountain, despite being routinely treated as a minority group, both in Marsabit District and Kenya (Table 4.6 above). Today, the Burji hold the prime agricultural land on the mountain and they are also prominent traders in Marsabit town. Many of them own wholesale shops and butchetries and are involved in livestock trade. The group also includes numerous retail traders (shopkeepers) and owners of fleets of lorries in the towns of Marsabit and Moyale. The Burji might not dominate Marsabit Mountain in numbers, but they certainly do in economic performance.

To a large extent, the lowlands of Marsabit District are inhabited by Gabra, Rendille and Samburu who, until a couple of decades ago, mostly subsisted on their livestock; camel, cattle and flocks of small stock (sheep and goats). Many of the groups, apart from those on Marsabit Mountain, live in the lowlands, either in mobile manyattas or settled villages around water sources in small hamlets. These villages are at Kargi, Bubisa, Korr, Maikona, Laisamis, North-Horr and other water points.

Many attempts have been made by the development agencies or the government to provide alternative resources and avenues for pastoralists. These have included the settling of impoverished pastoral people in planned schemes. Although some of these interventions may have been well-meaning actions, most of them made little impact on the pastoral sector. It is indeed the case that the nomadic pastoralists only settled when they were forced by the circumstances, for example following the loss of livestock herds to droughts (Jones 1984; see also the Chapters 5 and 16 of this book). Settled life brings new avenues and needs for the

* Others include 45 non-African people in 1962. For all the years, the figures for Somali are ‘Somali-stated’ and others include Sakuye, Ajuran, Degodia, Gurreh and Ogaden as the main ethnic groups, along with many other smaller groups. During all the population censuses, these clans were enumerated as separate ethnic groups. The Ajuran, Degodia, Gurreh and Ogaden live mainly in North Eastern Province and Moyale District. These groups do not form the main pastoral groups of our study area and we therefore pay no additional attention to them here. The focus of the study is restricted to the main pastoral groups and the Burji.
household members, although the demand for livestock and livestock produce to sustain the pastoral economy remains. Whether the settled households are better or worse off than the still mobile pastoral households in terms of well-being will be dealt with in Chapters 5, 7 and 14.

Languages spoken in the district and on the mountain

The most commonly spoken languages in the district are Boran, Rendille and Samburu. Today, many Rendille and Samburu are bi-lingual due to their very close ties. This is interesting because the Rendille\(^{42}\) speak one of the Cushitic/Hamitic languages of Kenya which is similar to Somali, whereas the Samburu are a Maa speaking people. Samburu have a very clear and striking facial resemblance to the pastoral Maasai, similar dress codes and similar traditional ceremonies and rituals (Daystar Communications 1982a; Spencer 1973). These are therefore the two main languages spoken in the southern part of the mountain and Marsabit District as well.

Language forms an important component of inter-group affiliation and adaptation to different cultures. The Gabra and Boran speak an eastern Cushitic/Oromic language or Borana language as frequently referred to (Daystar Communications 1982b&c). The strictness with which each language is spoken is defined by geographical territory and depends on affiliation, intermarriage and also on ethnic domination in a certain area. On the mountain, Boran-Oromo is the most commonly spoken language. Many people, especially traders and those who have had some years of formal education,\(^{43}\) in Marsabit Town and other rural centres speak Swahili as well, and a smaller number of them speak English. Boran, Sakuye, Gabra, Burji, Konso, Waata, Sidam, Garri and Ajuran all speak Borana in the mountain area, although Burji speak their own language too. According to Daystar Communication (1982a,b&c), while the Gabra and Boran are related in spoken language, the Gabra and Rendille share a certain clan name (i.e. the Odhola) and observe related rituals and ceremonies such as sorio and almado. Apart from sharing a camel herding economy, they also observe similar ceremonies and rituals with the same name (O’Leary 1985; Schlee 1989).

The Burji (a native group of Southern Ethiopia) language is another language spoken on the mountain. The original Burji language is a cussitic language of the Eastern Cushitic Highlands (Daystar Communications 1982b: 85). It is interesting to note that the Burji use their own language as a ‘secret-code’ among themselves to bargain for low animal prices on the livestock market. In common with all the groups on the mountain, learning the language of a neighbouring or host group is a strategy to affiliate oneself, to a certain extent, with the host group. This frequently takes place in a migration area like Marsabit Mountain, where most people\(^{44}\) indeed speak or understand two or more local languages.

---

42 The Rendille speak a language close to Somali which is believed to have developed as a result of an offshoot from the Somali (Spencer 1973, Daystar Comm., 1982a, Spencer 1998).

43 The section of the district population who are engaged in commerce and trade make frequent visits to Marsabit town for trade related activities. They are able to manage their activities better (stand to gain more) if they can speak some Boran-Oromo and Swahili languages, though not necessarily. The people in salaried employment commonly speak their mother tongue, and in addition they speak Swahili and English, as these also are the people with formal education.

44 We would like to thank our dear friend, Paul Baxter, for pointing out to us that very few Africans are monolingual (personal comment Baxter, 2003)
Population growth of Marsabit Mountain and sample sites in the plains

According to the 1999 national population census, Marsabit District had a population of about 120,000 people, a total land area of 61,269.2 km² and a density of 2 people per square kilometre (GoK 2001a: 1-68). Today, most of the district’s population are either concentrated around Mt. Marsabit (MDAR 2000: 5) or around rural trading centres and the villages in and around waters sources in the lowlands. Our crude estimate reveals that by 1999 at least 70 per cent of the district’s population was mobile or semi-sedentary. The reason for human concentration around the mountain is the agricultural production potential and other attractive economic activities of the mountain area. Elsewhere we pointed out that the share of the mountain population in the district progressively increased by weighted averages of about 13 per cent in the 1960s, 19 per cent in the 1970s, 24% in the 1980s, and about 31 per cent (excluding Moyale) and 21 per cent (including Moyale) in the 1990s (Adano & Witsenburg 2003, Table 4.5 above). These ratios reveal rapid growth of the mountain population between the 1960s and 1970s, compared to the 1980s and 1990s periods (GoK 1969, 1979, 1994a, 2001a). The decline during the 1990s of the mountain population in the relative share of the district may be largely accounted for by a reduced immigration process onto the mountain. The increase in population on the mountain during the 1970s coincides with the droughts that caused massive livestock losses in the region. Between 1959 and 1999, while there was a six-fold increase in the district’s population, the mountain population grew by about 18 times. By 1999, the mountain area alone (i.e. Mountain and Karare locations in Table 4.5) accommodated about 30 per cent of the total human populations in the district (i.e. Marsabit District alone). The settlements on the mountain are also more sedentary because of the availability of arable land and other services.

Up to now, however, we have treated the population distribution on the mountain as if it were uniformly dispersed. In fact this is not so. At micro-level, the human population around the mountain is unevenly distributed. Certain areas on the mountain evidently have a higher concentration of human populations than others. There are clustered areas of high densities on the mountain. Areas within the Central Division of the mountain such as Wabera and Nyayo-road support high human densities (about 4,000 persons) per km², whereas locations like Karare in the south are home to less than 10 people per km² (GoK 2001a: 1-68). The population on the mountain is also distributed along ethnic lines, except for Marsabit town where a variety of ethnic groups live. The population distribution on the mountain on an ethnic group basis rather restricts household re-allocation in order to relieve pressure on densely populated areas. This raises special interests of access to resources across these areas.

Besides Marsabit Mountain, Maikona and Korr trading centres in the lowlands are the other two sample locations of the study (see also Chapter 3). Table 4.5 above shows that Maikona trading centre belongs to the Maikona location (today a Division) and that Korr...
centre is part of the Laisamis location. During the last four national censuses, Maikona location had inter-censal population annual growth rates of about 2, 7 and 3 per cent, respectively (GoK 1969, 1979, 1994a, 2001a). The corresponding yearly population growth rates for Laisamis location were about 1 per cent between the previous censuses and about 4 per cent between the last two censuses. In particular, we sampled Maikona and Korr trading centres for the study’s surveys. Whereas Maikona trading centre had a constant population density of one person per km$^2$ in 1989 and 1999, Korr trading centre had densities of about 3 and 6 people per square kilometre respectively. Thus, on the one hand the Laisamis location exhibits lower inter-censal growth rates, except for the decade between 1989 and 1999, compared to the Maikona location. On the other hand, the Maikona trading centre had lower population densities per square kilometre during the 1989 and 1999 censuses than the Korr trading centre (GoK 1994a, 2001a).

National and Marsabit District human populations compared

To get an idea of the changes in population figures over time, Figure 4.11 shows a comparative growth path of the district and the national human populations.

Figure 4.11
Trends of human populations of Marsabit District and Kenya, 1960-99

Notes:
- Natpop refers to Kenya’s national human population and Distpop Marsabit District human population.
- Marsabit District also includes the current Moyale District, which has been a separate district since 1995. Moyale is included here for the sake of comparing population growth rate over time.

Source: Compiled by the author on the basis of Kenya national population censuses of various years and own estimates.

The above figure shows evidence of a continuous growth of the human population at both the district and national levels. A large part of the district population figures are drawn from the 1969, 1979, 1989 and 1999 Kenya National Population Censuses results. Since the late 1960s, the district population increases proportionately more than the national population. Between 1960 and 1980, Marsabit had an annual population growth rate of 4.3 per cent per
year while the rate for Kenya as a whole was 3.2 per cent per year.\textsuperscript{48} Between 1980 and 1999, the national population increased from 16,020,000 people to 29,588,000 people while the district population increased from 96,216 people to 182,336 people. This reveals a continuous growth rate of 2.6 per cent per year at national level and 3.5 per cent per year at district level. It also shows that whereas the annual rate of national population growth between 1980 and 1999 was one and a half times lower than that during the period between 1960 and 1980, the district population maintained a very comparable annual growth rate over the entire periods. That is from the 1960s to 1999.

Over the entire period, the district recorded the highest population growth rate between 1969 and 1979. Over the same period the inter-censal growth rates indicate that, whereas the district population grew by 6.2 per cent per year\textsuperscript{49}, the national population grew by 3.5 per cent annually. The trends clearly show that Marsabit District experienced a higher annual growth rate than Kenya as a whole. The likely reasons for the considerable increase in the district's population\textsuperscript{50} between the 1970s and early 1980s are the influx of people from the neighbouring Kenyan districts and people from across the Ethiopian border. The district population also recorded a substantial inter-censal increase between the 1969 and 1979 census for specific groups. For example, during this period, Samburu populations increased from 901 to 3,990 (an annual increase of 14.9 per cent), while the Turkana population rose from 1,036 to 2,929 (an annual increase of 10.4 per cent), Boran\textsuperscript{51} population from 13,432 to 27,694 (an annual increase of 7.2 per cent), while Somali populations increased significantly from 395 to 7,080 persons (an annual increase of 28.7 per cent per year), indicating considerable immigration levels. All these groups have their ‘home district’ in areas neighbouring Marsabit District (see Table 4.6). By contrast, the Rendille and Gabra populations grew by relatively low proportions of 1.2 per cent and 3.9 per cent over the same period (GoK 1969, 1979). The suspected immigration from the Ethiopian side might have been eased due to the fact that Kenyan law no longer required people under the age of 18 to have personal identification cards\textsuperscript{52} (commonly known as ID). The period 1969 and 1979 also coincides with the time of civil unrest in the wider region precipitated by the shifta raids that might have pushed certain groups into Marsabit, which was at that time a relatively stable district. The district and national populations show very similar growth paths for the period between 1983 and 1993.

\textsuperscript{48} The estimates of the national population are based on the FAO database (FAOSTAT: \url{http://apps.fao.org/}, 22 January 2003). The Marsabit District’s population figure has been adjusted for Moyale District using a continuous growth rate of 2.3 per cent after 1999.

\textsuperscript{49} This increase needs to be regarded with caution. Apart from human influx into the district, under-counting in the 1969 census and over-counting in the 1979 census might give rise to the high district population growth rate depicted here.

\textsuperscript{50} The process of high immigration into the district certainly did not cease in 1979 when the population census was conducted. However, the migration into the district in the early 1980s is difficult to assess because the 1979 and the 1989 censuses have been used to derive the inter-censal population growth rates over this decade.

\textsuperscript{51} Note, however, that the Boran were allocated more than one ‘home district’ and that Marsabit District is just one of these. Their other home districts include Isiolo and the current Moyale Districts (see also Table 4.7 on the main groups in the district).

\textsuperscript{52} The enforcement of the legal requirements for Kenyans to possess a personal identity card was introduced for the first time in 1978 and all persons over the age of 18 years were required to hold a national identity card. In practice, the chiefs and District officers have a mandate as to who should obtain the national identification card. However, the requirements to obtain an identification card change frequently.
After 1993, the district population growth rate overtook the national population rate and grew at a continuous higher marginal rate of 1 per cent per year. That is, while the district population grew at an annual rate of 2.9 per cent, the national population grew at a rate of 1.9 per cent annually.

Both the national and district human population figures are equally crucial in resource allocation decisions. Bearing in mind the population trends over the years, and with an emphasis on the pastoral economy, the livestock population is an important resource base to the pastoral economy and also for assessing the performance of the livestock sector in arid and semi-arid regions of Kenya. Broadly speaking, the population figures clearly show the higher rate of growth at district level compared to national level. These population growth differentials have direct relevance for the use of the stock of existing resources and for human welfare. The interesting research question arising out of the differences in the district-national population levels relates to both the availability and use of resources, in a broader perspective.

Physical capital

Water sources
Water is a critical resource and is of primary importance to households and to livestock production in a pastoral economy. The enhancement of water availability and distribution, in both time and space, has been one of the critical resource interventions by the government and NGOs in favour of the pastoral livestock sector and improvement of pastoral lifestyle. Water availability has frequently been pointed to as a main limiting factor for arable production in the region too.

However, the availability of water sources in the district varies widely between dry and wet seasons, and between lowlands and highlands. During the wet seasons there are many water sources, either man-made ones such as pans and dams or naturally occurring depressions where run-off water accumulates. The spatial distribution of water resources and rangelands forces pastoral groups to move in order to make maximum use of range resources. The widest distributions of pastoral households and livestock populations in the range are achieved during wet seasons. Such distributions are, however, solely dictated by the intensity and spatial distribution of rainfall. During the wet season there is less pressure on water resources in general, since surface water sources like pans and dams are largely available and also animals like camels need less watering. It is also worth mentioning that water sources determine the ways in which forage resources are utilised. In the dry season, when the demand for water is higher, the pressure on localised points such as boreholes and shallow wells is higher. As a result of the localised distribution of water sources during both normal dry seasons and during recurrent droughts, the existing sources come under intense pressure of use. In connection with this, the range land around existing water sources experience a cyclical depletion of forage and browse resources. The dry seasons are thus the instances when water availability is low, access rules are redefined, renegotiated and competition for access rights emerges, both between and within pastoral groups. However, water use rights and access procedures vary greatly between different ethnic groups in the area. These rules become even more variable when water sources are located on borders between ethnic groups.
or among heterogeneous groups as is the case on the Marsabit Mountain and during the time of most water scarcity at the heights of droughts or prolonged dry spells. Issues of water scarcity, water development, accessibility and use rights are relevant for both the high altitude areas and the low plains and will be discussed in greater detail in Chapter 8.

Sources of livelihood

Farming
As mentioned earlier, a considerable proportion of arable food production in the district comes from the high altitude areas and more specifically Marsabit Mountain. The mountain has a relatively good climate favouring arable farming and it accounts for about 80 per cent of the district’s agricultural (arable) production. The Central Division of Marsabit Mountain had an area of 2,090 km$^2$ and a total of 3,930 households in 1979. This area was reduced to 2,055 km$^2$ but household numbers increased to 6,945 by 1989. In 1989, the division had 5,681 farm-holdings of about 2 households per km$^2$, which generates an equivalent potential land holding of about 50 ha per household. The main crops grown on the mountain are maize, beans, teff, wheat and horticultural crops, with maize and beans as the most common and important food crops produced.

The surrounding low plains in the district, as opposed to the highlands, are mainly suitable for livestock keeping only. Although the pastoral groups derived a large part of their food needs from the livestock sector (directly or indirectly) in the past decades and exchanged grains with farmers only in times of need, at present a shift to agro-pastoralism for impoverished pastoral households seems a trend that raises concerns about the future. The availability of farmland on the mountain, trends in farm productivity and the potential of farming for food security will all be discussed in great detail in Chapter 12 which focuses on farming.

Other economic activities
About 80 per cent of the people in the district practise nomadic or transhumant pastoralism subsisting mainly on livestock and livestock related industries. About 10 per cent of the population is engaged in farming activities and mainly live around Marsabit Mountain and about 5 to 10 per cent of the people are involved in trade and related activities and salaried (formal) employment (MDDP 1994; Schwartz et al. 1991: 1). Almost all the main groups in the district (see Table 4.6) were traditionally nomadic pastoralists: moving with their herds from one place to another in search of water and good pasture. However, the economic sustenance of the people differed somewhat due to the livestock species which formed the main livelihood basis of a particular group (Spencer 1973; Various Daystar reports 1982; Fratkin 1998; Tablino 1999). In other words, although different livestock species were kept and owned by a group, one type of livestock species was perceived as the core livestock herd of an individual group. In this regard, the Samburu and the Boran were traditionally and predominantly cattle-keepers and occupied relatively higher altitude areas compared to the

---

53 In time scale we refer to periods more than 30 years ago when these groups were differentiated not by their lifestyle but by animal types as the basis of their production.
Rendille and the Gabra camel-herders (Various Daystar reports 1982a&c). The Gabra and Rendille camel-herders inhabited lower altitude areas whose conditions are in turn better suited for camels. In addition to their main livestock type, each group keeps a few donkeys and rears goats and sheep. It is often the case that, while camel herders keep greater numbers of small stock, cattle keepers keep more donkeys than camel herders. Among the cattle herders the donkey is the beast of burden used to carry people’s belongings and children or young animals when on the move, while camel herders use camels for transport purposes. All the groups used to depend largely on milk and meat and occasionally blood from their animals. Animals were indicators of wealth, source of prestige and pride, measures of social security and ties, means of establishing and maintaining social relations, especially marriages which are central to pastoral continuity.

Even in the olden days, say a century ago, the economy of these groups was neither closed nor were the groups completely homogenous entities. There were several layers of subsistence production and cooperation and a little, but crucial, complementary area for example comprising links with farmers for the provision of non-livestock produce and even blacksmiths’ artefacts. However, since the cattle keepers often occupy ecological zones that are also suitable for arable farming, it is probable that they frequently interacted with farmers. These days, the traditional basis of pastoral production no longer sustains the human population due to climate changes which can, at times, be dramatic; the way it had done for centuries. There are hardly any pure pastoralists left and changes in their economy are still ongoing (Oba 1996; Dietz & Salih 1997). In explicit terms, the livestock populations are unable to support pastoral populations independently and the people have to accept new realities in order to meet food or familial needs.

One aspect of the changes described above is a rapidly growing participation and integration of the former pastoralists into the wider cash market economy. These changes are already resulting in ‘new’ food types among the pastoral households and the activities that people are currently actively engaged in. Livestock marketing directly links nomadic groups to the regional as well as to the international markets. As a result, at international level, phenomena such as price fluctuations and changes in the relevant market factors have corresponding trickle-down effects on the present-day pastoral economy. In other words, the pastoral groups no longer rely on the local livestock sector, but are part of the national economy and of a global ‘village’ (Zaal 1998). Today, the pastoral integration into the cash sector is bridged for the most part by commercialisation of livestock and this has enabled pastoral households to incorporate non-livestock food material into their diet, along with some other needs (Little 1983; Kerven 1987; Dietz 1987, 1993). For these reasons livestock plays a crucial role in the pastoral integration into the cash market.

Within the context of a dynamic framework, the developments are not all negative for pastoral groups. Some changes are welcome because it allows them to adjust and cope outside their traditional livestock sector (Table 4.7 below). A respectable number of the original pastoral populations now depend on new activities and have diversified their livelihood profile. The former pastoral groups now accept new styles and incorporate a whole range of new food types that were formerly taboo or unavailable, internalise new values and explore new opportunities for earning a living elsewhere far away from home; creating ‘new nomads’ in the urban centres and around the globe. These changes often call for alteration in or
abandonment of traditional practices and rituals outside the ‘shadow of livestock’. We address the changes that are taking place in the region through a comparative approach to the current and the former pastoral households in the lowlands and agro-pastoral ones on the mountain. We also investigate asset and wealth holdings (including livestock, land and other sources of wealth) within and between different groups in the region.

*Pastoral decline, wage employment and migration*

At the onset, wage employment for individuals of the pastoral sector was a response to the payment of a head tax\(^\text{54}\) (*i.e.* a poll tax) on each adult male in cash during the colonial period, in the 1950s (Sobania 1979). By then, the general perception on working outside the livestock sector as a watchman, actively trading, or being a *shamba* man (boy) made a negative impression on the nomadic people. It was an option that is only intended for men from poor families and households (Daystar Communications 1982c; Ramat Kushi 1997, pers. comm.). In those days, given that labour was an intensive input factor into the livestock sector, any withdrawal of manpower competed with the labour for tending animals or proper livestock husbandry. In addition, the livestock sector could afford its populace a reasonable subsistence production, facilitated by high livestock per capita numbers (O’Leary 1990; Baxter 1990; see Chapter 7 as well). In this respect, there was probably no apparent need for alternative employment outside the livestock sector. This was a kind of common pastoral viewpoint. In times past, missionaries came and established rural centres with schools and more children of pastoral background were enrolled in schools and never fully returned to the pastoral lifestyle. The establishment of health centres, the distribution of relief food and later other government institutions provided new job opportunities outside the pastoral sector.

A lot of recent droughts caused many pastoral households to settle down around the rural hamlets. Time has gradually allowed the pastoral population to get used to a settled lifestyle and amenities and to accept fresh values that sedentarisation brought along. The settled communities gradually drifted away from the pastoral lifestyle in terms of economic production and subsistence dependence on the livestock sector and provided a significant link between the pastoral economy and town life. In addition, the settled lifestyle brings new experiences and moral values. The gap between the settled life and the nomadic groups did not widen but the latter were ‘pulled’ to the former. Owing to economic depression in the livestock sector in recent years, the rural hamlets are a source of information on the conditions of range units, trends in livestock prices in the various local livestock markets, news on relief food, as well as even on the wider national economy and politics. The reasons, causes and motivations behind the sedentarisation process and the perception on the changes are elaborated on in Chapter 5.

Owing to several changes among the livestock sector, the adaptive mechanisms of the pastoral peoples have been rendered obsolete over the years and the pressures from changes are so enormous as to warrant an immediate adjustment in response. For example, in the wake

---

\(^{54}\) In practice, the old, infants, etc were exempted from paying poll tax and the *abba warra* (the male head of the household) paid for all members of his *warra*. Boran was eager to pay one pound (£1) and kept their tax receipts as evidence of their right to graze in Marsabit. Many paid tax in Ethiopia and in Kenya as well and established a sort of dual citizenship, which meant dual grazing rights. This ceased after the collapse of Boran Pastoralism and sedentarisation (Special thanks to Paul Baxter for bringing this important fact to our notice).
of frequent droughts and subsequent pastoral decline of the 1970 and 1980s (Markakis 1993),
many individuals and families migrated from the pastoral sector to the urban centres to seek
wage employment. These people could not secure better employment and wage rates due to
their lack of formal education. Such people ended up in large cities as watchmen, occupying
one of the lowest social strata and guarding enormous properties and the wealth of rich
Kenya. They slept during daylight hours and carried out their guard duties during the cold
hours of the night.

Table 4.7
Distribution of the main groups living inside and outside ‘home’ districts

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Total</td>
<td>In</td>
<td>Out</td>
<td>Total</td>
<td>In</td>
</tr>
<tr>
<td>Boran</td>
<td>Isiolo</td>
<td>58,346</td>
<td>83</td>
<td>17</td>
<td>34,086</td>
</tr>
<tr>
<td></td>
<td>Marsabit</td>
<td>15</td>
<td>85</td>
<td>39.4</td>
<td>60.6</td>
</tr>
<tr>
<td>Gabra</td>
<td>Marsabit</td>
<td>11,487</td>
<td>98</td>
<td>2</td>
<td>16,108</td>
</tr>
<tr>
<td>Rendille</td>
<td>Marsabit</td>
<td>13,724</td>
<td>99</td>
<td>1</td>
<td>18,729</td>
</tr>
<tr>
<td>Samburu</td>
<td>Samburu</td>
<td>48,750</td>
<td>96</td>
<td>4</td>
<td>54,796</td>
</tr>
<tr>
<td></td>
<td>Isiolo</td>
<td>1.0</td>
<td>99</td>
<td>0.2</td>
<td>99.8</td>
</tr>
<tr>
<td></td>
<td>Marsabit</td>
<td>1.0</td>
<td>99</td>
<td>2.0</td>
<td>98</td>
</tr>
<tr>
<td>Turkana</td>
<td>Turkana</td>
<td>181,387</td>
<td>87</td>
<td>13</td>
<td>203,177</td>
</tr>
<tr>
<td></td>
<td>Samburu</td>
<td>5</td>
<td>95</td>
<td>7</td>
<td>93</td>
</tr>
</tbody>
</table>

Notes:
a. ‘Total’ refers to the national population counts for each of the groups in absolute terms for the year in question.
b. ‘in’ and ‘out’ refer to the proportion of each group living inside and outside the home districts, respectively,
expressed as a share (%) of the total population of each group during the respective year of census.

To gain an understanding of the pastoral sector’s emigration to the rural centres, we
examined the trends of the main ethnic groups in the district who are living outside ‘the
home’ districts (Table 4.7). In this context, the proportion of the group enumerated outside
the home district may be regarded as a rough indication of the emigration tendencies of the
pastoral group.

In the literal definition of the ‘home districts’ of the groups, these are as shown in the table.
For example, the ‘home districts’ for the Boran are Isiolo and Marsabit (including Moyale
District), Marsabit District for the Rendille and Gabra; Samburu, Isiolo and Marsabit Districts
for the Samburu; and Turkana and Samburu Districts for the Turkana. The figures in the table
are calculated on a district basis and some interesting observations can be drawn with respect
to emigration trends. Firstly, the Boran population shows a decreasing trend in Isiolo District
but an increase in Marsabit District. It is apparent that by 1989 Marsabit District was the main
home district for the Boran. Yet, the Boran population retained the highest percentage of the
total population residing outside the home districts when compared to all the other groups.
Secondly, except for the Boran, the rest of the groups show a very similar ratio of emigration
tendencies with increasing populations outside the main home districts. Thirdly, the Gabra

[55] The concept of ‘home district’ may be broadly interpreted as those districts in which the majority of the
ethnic groups are normally resident and in which they occupy a reasonable proportion of the land
(Population Census, 1962: 36). Although the detailed 1999 Census report has recently been published, we
were unfortunately unable to obtain the volume that contains relevant information on ‘tribe’.
and Rendille populations outside Marsabit District evidently increased over time. Despite this, the number of Rendille residents outside the district show increased consistently between the years, while the increase was inconsistent for the Gabra. Fourthly, whereas the Samburu population inside the main home district (i.e. Samburu District) decreased through time, the population outside the other districts of Marsabit and Isiolo increased. Similarly, we note that the population of Turkana decreased inside their home district of Turkana, but increased in the home district of the Samburu. This again confirms the fluid mobility of people between districts and their use of resources mentioned earlier.

Hence we wish to point out that the pastoral emigration pattern is characterised by a move to and forth across the borders of the main home district, and elsewhere too. Nevertheless, it is unclear what activities the emigrants are engaged in across district borders, either as nomadic people or as labourers. Although it is probable that where a group has more than one home district, as in the case of Boran, Samburu and Turkana, emigrants might have been able to keep their former occupation in pastoralism in a different home district while other emigrants might have become involved in a different economic activity such as wage labour or salaried employment elsewhere in the country. On the one hand, such patterns of emigration may also be interpreted as one of the broad measures of the pastoral sector's integration into the broader national (cash) economy. One the other hand, such changes may indicate a decline in the specific group's livestock sub-sector. On the basis of both the labour migration and changes in the basis of livelihoods, neither the pastoral communities nor their resource bases are static in time. People and their activities are characterised by dynamics across the districts which allow them to adjust ably to the changes in the spatial distribution of resources. The migration of herds, including the cross-district border exploitation of resources is, of course, a key to the survival of pastoral communities. If pastoral labour migrations take effect they may permit access to non-livestock means of production for the pastoral peoples. Thus, the changes in access to resources within the pastoral sector can happen when people and their herds move across district borders and also when migrant workers (except herding labour) engage in non-livestock sector employment.

Social institutions that determine access and management of resources

The pastoral decline, the trend toward commercialisation, sedentarisation and household diversification resulted in a change of resource use. Traditionally, pastoral groups have always had clearly defined rules of access and management of resources. For instance, the Boran way of water allocation and management is famous (Helland 1982; see also Chapter 8). Institutions in society define access rights to specific resources that are needed to achieve a livelihood. The set of property rights determines the quality and quantity of the resource and its productivity. An understanding of this part of the social capital that links people to their environmental resources is needed to assess whether environmental change, economic uses and livelihood outcomes are sustainable and desirable for the future.

There are many types of property rights to resources and equally significant differences exist between these rights among the lowlands and the highlands in the district. In the lowlands, the property rights are further split between livestock and their produce and the
shared-range resources. While rights to animals are generally private in the region, range resources are communally used and use rights are governed by customary laws of a specific group being considered: either the Rendille, Gabra, Samburu or any other group. In the highland areas and particularly with reference to the Marsabit Mountain, the rights over resources are differentiated according to resource type: farm plots, livestock, forest resources or other environmental (e.g. woody vegetation) resources beyond the settled area and also outside the protected areas.

In the high altitude areas, owing to the nature of farming activities that underpin human occupation, ownership rights and access rules to resources differ from those of the pastoral communities in the surrounding lowlands. In the mountain area, and more particularly in Marsabit Forest Reserve, four types of resource ownership (property) rights can be identified: state ownership of protected areas of Marsabit National Park and Forest Reserve; private ownership of farm plots, but without a proper form of title deeds; the private ownership of livestock and communal ownership of pasture and water sources. The rangeland and woody vegetation resources beyond the borders of farmlands, settled areas and outside the protected areas, are all communally shared by the individual groups. The various arrangements and the dynamics in use and access rights to resources are characterised by flexibility. This is one of the salient features of Marsabit District and one on which a significant part of each chapter will focus.

Conclusions

This chapter basically presented some general background information about the study area. More precisely, we identified the various capitals that form the main basis of human economic production and also highlighted the governing institutional framework. In the study region, rainfall is the most important factor influencing economic productions, including rangeland and arable farming. In this regard, we examined rainfall variation in the northern Kenya region in general and on Marsabit Mountain in particular. Thus, in framing the rainfall trends in the wider regional perspective we observed a more general decline in rainfall for Marsabit station. The observed rainfall trend may have varying implications for a range of resources.

The data on livestock shows marked year-to-year fluctuations for the three livestock types. It is also apparent from the data that while population numbers are highest for small stock, these animals are not the main determinants or indicators of the ability of the households to derive reasonable supplies of their food requirements from that sector. The reasons mentioned for this are their low daily milk and meat yields for human consumption. Contrastingly, the cattle and camel populations with low population estimates have higher milk and meat yields. We saw that the livestock population in the district shows, against a high human population growth, a general decline in both absolute and relative terms (and thus by extension their produce and wealth) from 1977 to 2000. The downward trends in livestock wealth are true in absolute and relative terms and especially for small stock and cattle. The general decline in livestock wealth has had a great impact on the socio-economic trends and developments in the
last century. The background and details of the pastoral economic decline will be the focus of the next chapters.

We contrasted human population growth at national and district level. Illustratively, while the human population grew continuously over the years at both national and district levels, the district population grew at a faster rate than the national one. In other words, we clearly observed a more rapid population growth at district level when compared to national level.

We also pointed out that the vast majority of the district population are pastoral groups, at least in the past. Although not significantly related, the livestock numbers and rainfall data depict similar downward trends over time, especially during the last decade (see Chapter 16 as well).