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

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Summary and conclusions

It is presently widely acknowledged that pastoral mobility is a sustainable use of the African drylands. Livestock keeping is an efficient way to use vegetation in a zone where no agricultural crop can grow sustainably, without massive investments. However, since 1970, numerous drawbacks in the pastoral economy, like droughts, war and declining terms of trade for pastoralists have pushed an increasing number of families out of pastoralism. This poses dilemmas for the future of pastoral communities. Even though pastoral mobility may be sustainable for the pastures, nomadic people today often own too few animals to subsist from. This means that an increasing number of pastoralists have to look for alternative resources to earn a living. Urban or agricultural settlements near water points or in sub-humid (mountainous or riverine) areas are therefore growing in many sub-Saharan regions. Especially impoverished pastoralists settled in these more humid zones to build up other livelihoods.

However, such small, humid pockets in the drylands have been used in the past by pastoralists as fallback areas in times of drought. They also function as important nature reserves and water retention areas. That such areas are now increasingly occupied by people who cannot subsist from animals alone, signals a dialectical process within the pastoral production system: the poor are sloughed off by the system and settle in wetter zones. However, this enlarges the problems faced by the nomadic people. Whether the present pastoral production system is sustainable without a structural change to overcome this contradiction is therefore doubtful.

This study was inspired by a concern about the declining trends in livestock and the challenges it posed to pastoral people to overcome this threat to their survival. Migration to Marsabit Mountain, where rainfall is relatively high and agriculture is possible, increased population pressure and poses a challenge to the environmental sustainability in the settlements. We investigated why people settled and what the effect had been on resources and the traditional institutions that govern them. We compared the socio-economic background and welfare of three types of households: nomadic households, households that
had been helped in settlement schemes and those who settled spontaneously. This chapter summarises the main findings of the study.

Understanding the cause of the pastoral economic crisis

National and district level

The research project took a long-term approach to assess changes in livestock numbers and related resources in Marsabit District, and contrasted this with livestock dynamics at national level (Chapters 4 and 10). In addition, we assessed the changes in the livestock herd sizes at household level between two survey periods (Chapter 7), of which one period occurred during El Niño rains, and one during a major drought (1997/1998 and 2000 respectively). The long-term trends in the livestock assets in the region reveal a number of insights into the livestock-based household economy.

Until the 1960s, the livestock sector in the district was self-sufficient in terms of economic production. By then trade was only a minor component of the pastoral economy, and largely not driven by food needs. Even so, trade was important either as a matter of choice of occupation for a few people or for the purchase of goods such as coffee berries, clothes and axes. From the late 1960s to the 1980s, the majority of the pastoral households were able to meet a large share of their subsistence food requirements from their own herds and with limited marketed livestock off-take. However, the recurrent droughts of the late 1970s and the mid-1980s had major negative effects on the livestock holdings at district level. During this time, herding households enjoyed relatively positive terms of trade in the livestock exchange for grains. The (caloric) terms of trade remained largely positive and the Kenyan economy was economically sound in the 1970s and 1980s. Households who could no longer feed themselves sufficiently by using their livestock gained from increased marketed livestock to purchase food to supplement needs. The favourable caloric terms of trade also came about as a result of the relatively good and stable economic performance of the Kenyan economy at that time. Nevertheless, the frequent droughts and the government ban on livestock movements outside the district impeded efficient livestock marketing and hindered a full realisation of the potential gains from livestock trade.

The numbers of livestock per capita have declined continually since 1970. After 1990, the bottom line of a minimum of four tropical livestock units per capita (4 TLU/capita) required for subsistence was surpassed and the trend reached a level that meant that people could not subsist from their animals alone. The heavy livestock losses by droughts and war caused a traumatised and destitute population, compelling some households to drop out of the livestock production system. In particular, families who could not be restocked by relatives through social security networks had to settle. Some of them settled with government and missionary assistance, to start a new life on Marsabit Mountain.

Around this time, there was an increased government effort to develop the initially neglected arid and semi-arid areas (ASAL) in Kenya. The establishment of the ASAL projects and of the Ministry of Reclamation and Development of Arid, Semi-arid Areas and Waste Lands was partly spearheaded by this move. These programmes were fuelled by the need to develop neglected potentials of the arid areas and the Kenyan economy continued to perform
healthily. However, in the late 1980s, the Kenyan economy deteriorated and the functioning of the livestock marketing channels faced liquidity constraints that necessitated the liberalisation of meat prices. The downturn in the Kenyan economy and its image in the eyes of the international donor agencies made things worse. In the early 1990s, the growth rate of the Kenyan economy fell for a couple of years in a row and the Kenya shilling suffered a steep loss of strength and purchasing power.

The per capita livestock wealth declined to below the critical level for subsistence food requirements, which was also partly due to the negative rainfall trends. The decline in livestock wealth caused structural problems in the pastoral economy that increased households' need for increased livestock sales for food and to meet cash demand for uses such as school fees. The increased commercialisation of livestock by making use of favourable terms of trade was, in theory, an option. In principle, there were three pathways through which pastoral households in the district could exploit the livestock marketing opportunities and realise comparative advantages in trade. First, there would be the option of cross-border trade, albeit illegal, to Ethiopia. However, as a result of the large livestock population in Ethiopia, the relatively weaker Ethiopian economy and the higher livestock prices in Kenya, the livestock trade flows from Ethiopia into Kenya. Livestock trade flows from Kenya to Ethiopia occur rarely, meaning that this route does not offer many opportunities for the livestock off-take. Consequently, the weak economies of the countries neighbouring Kenya compel the livestock keepers in the district to rely more on the domestic economy for commercial livestock off-take. Secondly, the domestic demand for meat potentially exists at the local rural centres and in Marsabit Town, but this demand remains too low to absorb the marketed livestock. Thirdly, livestock could be exported to the major urban centres in Kenya or to the global market through Mombasa. However, the livestock export to areas outside the district, to meet the Kenyan urban demand for meat, is a limited option. The distances from Marsabit to the urban markets with a high demand for meat like Nairobi and Mombasa are huge and the associated marketing transaction costs are high (see Chapter 10). The poor state of the infrastructure also severely limits the benefits from livestock trade. In addition, national livestock exports dropped from the 1990s onwards, perhaps because of stiff competition in the international markets and restrictive regulations on livestock exports outside the country, which could be potential barriers to trade. In the later years of the last decade, Kenya no longer exported meat or animals.

During the period of decline in meat or animal export, the Kenyan economy also went through a depressed economic state, with this also being affirmed by a declined gross domestic product per capita (GDP/capita). It is likely therefore that with the poor economic performance and the fall in the income of an average Kenyan in real terms, the demand for meat (a luxury commodity) fell outside the budget of the majority of the Kenyan households. The potentially reduced demand for meat counteracts any market force intended to improve livestock and meat prices. Indeed, the price of meat at a local butchery in Marsabit town stagnated at a nominal price level of Ksh. 100 per kilo between 1990 and 2001. In relating the economic performance of the Kenyan economy, there is ample evidence of the downside of Engel’s Law in demand for meat in Kenya. In the light of this finding, the Kenyan economy has deteriorated since the 1990s when it was most needed by the pastoral sector of the population studied. Indeed, in 1991, when the human-livestock indexes were at threshold
level, and thereafter when livestock wealth dropped below the critical level of 4 TLU/capita, the external aid flows declined and the Kenyan economy started to perform even more poorly. Therefore, 1991 marks the beginning of the structural crisis of the Kenyan economy and of the average pastoral households in Marsabit.

According to the GoK (1999) poverty assessment report, about 80% per cent of the current pastoral households in Marsabit District live below an absolute poverty level of one dollar per person per day. As we have demonstrated, the inability of livestock keepers in Northern Kenya to rise above minimum survival levels and rely on the national economic performance for increased livestock commercialisation, entrap households in poverty. In the face of the falling Kenyan economy, the pastoral households are confronted with an uphill battle to climb out of poverty. The problems of the pastoral crisis may be attributed to factors such as a long distance to the main markets, negative rainfall trends, the deplorable state of the Kenyan economy and the failure of public policies to improve household welfare. As a consequence, the Kenyan economy is unable to bail the pastoral households in the region out of the livestock-based economic crisis. Any future changes in government policies aimed at improving efficiency of livestock marketing and offering better livestock prices will contribute greatly to the pastoral welfare and livestock-related industries.

Herd size decline at household level

The decline in livestock assets is also revealed by data at household level (Chapter 7). The fact that many households have few or no animals today means that social relations, which are traditionally built on herds, are being undermined (Chapter 11). This has implications for social articulations and human welfare derived from livestock assets. Ownership of only one type of animal by many households represents a lack of herd diversification, which indicates a weak ability of the household to bear risks when confronted with stress factors.

There are clear herd size differences among sample households across the ecological zones and according to the sex and ethnicity of the household head. The decline in human-livestock indexes is true for all ethnic groups in the district, but some differences are discernable. Female-headed households consistently show lower herd sizes in almost all measures (except for two villages in TLU terms) compared to the male-headed households across the studied sites. This shows female-headed households to be a vulnerable group. However, the ethnic-based analysis shows a wider gap in the herd size differentiations across the households than, for example, gender-based differences. Also, the (limited) data from previous surveys indicates similar falling trends in herd sizes. In this regard, although the overall livestock wealth declined over time at household level, our own results with regard to the household changes in herd wealth show that the relatively poor happen to be different households over time. This result shows that poverty is dynamic through time and also suggests that the livestock-poor households, ethnic groups and communities score differently over time (cf. Chapter 14). This finding also confirms the herder’s view that likens livestock wealth, symbolically, to ‘passing clouds’ — where the herd-rich and poor households can change status over time. The dynamics in livestock poverty has direct consequences for how poverty is addressed through intervention efforts today and for how people themselves deal with poverty as well.
The inequalities between households and differences according to sex of the household head, between ethnic groups and across ecological zones are clearly visible. In this process, it might be worth paying attention to the root causes of poverty. Life-cycle events such as deaths, extreme natural events and migration of the male head of the household often, singly or combined, triggered such differences in poverty. The main reasons why the male heads of households migrate are often poverty and a lack of employment opportunities locally. Therefore, one of the primary issues that needs to be addressed in the development programmes in the areas is to provide enabling economic conditions to the pastoral households so as to absorb the labour force rendered redundant by the livestock crisis.

Commercialisation and institutional change in response to livestock decline

Spatial price differentiation and regional livestock markets
The decline in livestock assets raises a greater need for market integration. The decline in livestock numbers would not have been so problematic if alternative livelihood strategies had been able to compensate for the stock losses. The commercialisation (or commoditisation) of the livestock assets, for instance, was for some time a way out, considering the more favourable terms of trade in Kenya until the early 1990s. Three livestock market centres were studied to investigate the functioning of the livestock markets and to provide an indication of the commercial off-takes across the sample locations (Chapter 10).

The spatial livestock markets reveal crucial differences in livestock prices and also conceal losers and beneficiaries with regard to the livestock/grains terms of trade. Of the markets studied, Marsabit is the main livestock market in the area for cattle and small stock as well. Also, cattle are sold more often on the mountain than at the markets in the lowlands. The prices for small stock are also higher on the mountain compared to the lowlands, and also higher in Maikona compared to Korr. The spatial price differences are seemingly attributed to the number of traders, effective competition on the market and traders’ behaviour to depress livestock prices and proximity to a road network. Attempts to improve market price information in the recent past have been used negatively by the traders to bargain for low animal prices. Thus, efforts aimed at enhancing the functioning of livestock markets created asymmetric marketing information (i.e. prices) between traders and livestock producers. The commercialisation of livestock is often favourable for the pastoral households in terms of the (caloric) terms of trade (cToT); a measure based on the relative livestock and grain price ratios expressed in each case after having been adjusted for the caloric food content. The fact that food values are constant in inter-temporal terms means that changes in the cToT are brought about by the relative changes in the livestock and grains prices. Bearing this in mind, the cToT is higher for cattle than small stock. In relative terms, the pastoral households gain from trade when livestock prices increase more proportionately compared to the grains price and thus the livestock keepers lose when animal prices fall harder than grain prices. This phenomenon clearly occurs during the dry seasons. Access to the market plays a key role in shaping the direction of cToT change. Poor access to the market not only affects relative livestock prices but also causes a high increase in the grain prices. A higher increase in grain prices often offsets gains from the livestock trade, which potentially accrues to the livestock
producers in terms of favourable terms of trade. In general, relief distribution of food often improves terms of trade in favour of livestock keepers. However, while the distribution of relief food may influence changes in livestock and grain prices, lags in its distribution perpetuate price variations at the local markets.

The findings as regards the spatial differences of livestock prices across the markets studied clearly showed the importance of access to the market and the livestock price risks faced by households at specific sites. The studies of the local livestock markets in the region indeed reveal crucial insights that aggregation of specific livestock markets may not reveal.

Who benefits from the fall in the livestock assets in the region?
At the local markets, the livestock prices have remained under the control of local livestock traders and their interests – which are diametrically opposed to those of livestock producers – and this has tended to depress market prices. The local traders’ malpractices in trade and the high transaction costs involved in livestock marketing have shaped benefits from the fall in the livestock populations and the heightened needs for livestock commercialisation by the pastoral households.

First, the local traders have better access to market information and can therefore negotiate low prices locally. The local livestock traders use information of poor livestock prices at the terminal markets to negotiate low animal prices at the local markets, even though the local (Marsabit markets) and terminal (urban Nairobi) livestock market prices often have hardly any influence on each other on a day-to-day basis. Secondly, the truck owners charge about 14 per cent (for cattle) of the terminal market gross livestock sales per one-way trip. This charge, coupled with other marketing overhead costs, reduces the livestock trader’s potential profits and serves as a disincentive for offering better prices. Thirdly, the local butchery-owners-traders earn gross sales values which are higher by about 39 per cent for cattle and 33 per cent for small stock than the average local livestock prices in the area. Thus, there are three dealers in the livestock-marketing channels that seem to benefit from the downward trend in livestock assets and the rising drive of livestock producers to increase the rates of marketed livestock off-take in order to finance shortfalls in subsistence food needs: the local livestock traders, truck owners and butchery-owners/operators.

Risk-sharing mechanisms of herd redistribution
The frequent exposure of pastoral households to risk is a common event, and such events have necessitated internal responses to ameliorate the negative effects of asset loss. Moreover, the absence of formal insurance arrangements and credit markets would increase the need for informal private and social insurance arrangements. However, the performance of local institutions faced by stress factors should be considered when assessing the long-term changes in household herd sizes. The continued decline in average livestock holdings, both in per household and per capita terms, clearly suggests a reduced livestock asset base and, as a consequence, the weak capacity of the average household herd sizes to support social security networks. In inter-temporal terms, the fall in the average herd sizes translates into a shrinking of the ratio of the relatively rich-herd households and an increase in the proportions of herd-poor households. The share of herd-poor households is likely to have grown considerably over time and particularly in recent years. Thus, although individual periodic stress may cause
Idiosyncratic livestock losses, the accumulative effects of recurrent droughts due to negative rainfall trends in the region may have caused overall livestock losses. The latter weakens the livestock asset base and livestock-dependent social relations and structures.

The fall back on livestock assets to mitigate exposure to risk is based on trust, social norms and codes of conduct as defined by cultural values. The motives for inter-household herd transfers may in more broad terms include altruism and reciprocity. The former form of exchange is based on moral obligations of the herd-rich household owners to effectuate transfers to the poor and the latter is based on the future expectations that the recipient reciprocates when called upon in times of need.

On the basis of livestock-based social capital, a number of points can be concluded with regard to our findings. Firstly, the local institutions of inter-household livestock exchanges are based on norms, cultural values, codes of conduct, interpersonal social relations and networks, and even emotions. Putting emotions aside, this range of subtle values is transmitted through life-long informal learning processes at the specific community level. It is probably a lack of sharing norms and codes of conduct (imparted through language), or differences in prescriptive value judgement of norms between different ethnic groups that constrain inter-ethnic livestock sharing and risk-pooling arrangements. The diverse interpersonal relationships are cemented by trust and confidence between parties concerned and affirmed by gift exchanges. The livestock exchanges can be effected either to reduce risk realised by the households (ex post transfers) or transfers affected to deal with anticipated risk exposure (ex ante transfers).

Secondly, the livestock exchanges (animals given out or received) serve either private or social insurance arrangements, conditional on whether animals are given or received by a household. Our analysis of herd tenure diversification in Chapters 7 and 11, based on past livestock loan exchanges, shows differentiated rights over animals in one’s kraal. The animal transfer arrangements and different ownership rights that result from them are dictated by the contractual arrangements at the time of animal transfer. It clearly emerged that the herd-rich owners have a higher index of herd tenure diversification compared to the relatively poor-herd households. It also emerged that the index of herd tenure diversity does not completely diminish as households drop out of the mainstream livestock economy and settle down, but is in line with a gradient from herd-rich to the herd-poor individuals or households. Besides the livestock herders’ exploitation of the heterogeneous range units and keeping of diverse livestock species to manage risk, the herd tenure diversity index shows an additional strategy used by livestock herders to respond to production failure in their midst. Our derivation of the herd tenure diversification on the basis of the past transfers and as a means of self-insurance, reveals the extent of herd sharing over a long-term period. The measure of herd tenure diversity highlights four crucial findings:

1. The herd-rich households have a greater capacity to create social relationships and affirm a wider social network as long as livestock wealth lasts. This form of transfers is partly motivated by rational peasant decisions against future aversion to risk and partly by reasons of reciprocity.

2. The importance of livestock transfers is greatest where other forms of insurance arrangements are expected to be weakest or missing altogether.
3. Closely related to (2), the herd-poor households are more likely to show a greater need for social and private insurance transfers compared to the relatively herd-rich households, or alternatively, the poor households are more likely to show higher inclinations to both ex ante and ex post herd transfers.

4. It also emphasises the significance of livestock-mediated social relations and risk-sharing mechanisms among the studied communities.

We also analysed inter-household herd transfers based on recent animal exchanges by the sample households. Despite some differences across the sample locations, it was clear that relatively more households in the lower wealth quartile suffered livestock losses and engaged in more transfer arrangements (both animals received and animals given out) as well. This seems to suggest that livestock exchanges are also crucial among the herd-poor households. In addition, higher proportions of animal transfers are made either to direct blood relatives (agnates) or people who are related by marriage (affines). This in turn reveals that under the informal arrangements, where contracts are not written and difficult to enforce, human relationships might provide the basis for strong moral obligations and commitments to honour social contracts.

The finding that the poor have less diversified herd tenure and proportionally suffer more livestock losses and are engaged in gifts transfers questions the capacity of social capital, embedded in livestock assets, to respond to stress factors. This finding in particular seems to underline the exclusion of livestock-poor households as regards nurturing and benefiting from social capital protection. The evidence that a large number of households are poor herd owners illuminates the weak capacity of herding communities to effectively respond to negative adverse shocks through social capital. Therefore, livestock-based social capital does not substitute other forms of capitals, embracing natural, human or physical capital. It is essential to recognise the importance of social capital components and their strength and weakness in addressing poverty in its various dimensions. Moreover, any expectation of efficient and effective functioning of social capital institutions a priori would be expecting a lot from a weak resource base. For example, the low index of herd tenure diversity is a clear manifestation of a weak livestock asset base, which is needed to affirm and re-enforce human social relations, but it does not capture the full extent of social capital within a group. The herd-poor households, although less diversified, might even need more spread-out social networks and arrangements in order to survive. Any attempt to investigate the significance of social capital either to minimise current or future effects of negative external factors, or to assist the perpetually (chronic) poor households, only contributes partially to wider institutional structures within which livestock-based social capital operates. On this note, the extent of herd sharing and diversification reported gives an impression of the context of the poor resource base within which we assess the inter-household animal transfers. Thus, the focus should be on the often dynamic social and economic contexts within which risk pooling and livelihood strategies operate.

The weak livestock-sharing institutions are consistent with the fact that recurrent negative rainfall impacts and other stress factors, as analysed in the study, have accumulatively created greater impacts on the livestock assets than can be absorbed by the social institutions of herd redistribution in response to major economic crisis. In our view, the functioning of social
capital generates social insurance (or solidarity synergies) between the herd-rich and herd-poor households in dealing with risk exposure and vulnerability. However, the capacity of herd transfers between the herd-rich and herd-poor households to provide effective support to herd-poor households is limited. Thus, it is likely that the ability of the social relations and herd transfers to improve the general welfare of the herding households is also limited. Therefore, future development efforts targeted at enhancing human welfare and improving rural incomes may promote, rather than undermine, indigenous institutions of coping and mitigation strategies. However, we need to keep in mind the weak state of the social institutions based on livestock wealth. In this regard, the herd-poor households show a greater need for external interventions.

Sedentarisation, diversification and changes in natural resource management

As we have clearly shown, the continued long-term decline in livestock resources resulted in an uncertain predicament for the human population in Marsabit District. The relevant options open to the inhabitants of Marsabit District after falling human-livestock indexes can be summarised as livelihood diversification, migration and sedentarisation. One option in response to impoverishment was to start agriculture in the more humid zones like the Marsabit Mountain area. This was indeed being tried out on a large scale. Migration to the Marsabit Mountain area resulted in a population increase from about 2,000 inhabitants in 1960 to about 37,000 inhabitants in 1999. The ethnic background of the migrants who had settled in the rural villages on the mountain was mainly Boran, Rendille, Samburu, Gabra, Turkana, Waata, Konso and Burji. Some had already farmed in their area of origin, but for the majority farming was new.

However, acquiring access to farmland appeared to be very difficult for many people (Chapter 6). Even though the total land that has some agricultural potential in the Marsabit Mountain area covers about 2,000 km\(^2\) excluding the National Park, only about 7 per cent of that land has now been transformed into farmland (Chapter 12). This means that the mechanism that made land available for agriculture was greatly hampered by difficult and non-transparent procedures. At the same time, those who managed to acquire a piece of land that can be used for crop growing often lacked the knowledge, tools and labour to make their land fully productive. Only about 20 per cent of the farming households in the wet zone of the mountain produced enough maize and beans for subsistence. Because of small farm sizes and low grain productivity, farmers are increasingly turning to *mirraa* production.

**Livelihood diversification on Marsabit Mountain**

Evidence presented in Part III of this book shows that the majority of the population in the rural villages on Marsabit Mountain have a diversified livelihood profile. Very few people subsisted from one resource alone, but combined grain production with livestock keeping and cash earnings. The combination and degree to which a lacking resource is compensated for by another resource varied per household, per village and per year. It was, however, evident that in times of stress, livestock keeping formed a very important resource for the majority of the households, including for households largely engaged in farming. This means that farming
and pastoralism are not antagonistic livelihood strategies. Among the first generation of pastoral migrants who started farming, it was very clear that those who had animals did better in farming than those who had no animals. Most settled people try to restock, and those who combined farming and herding were usually better off, in drought times as well. Indeed, we found that settled households with moderately large herds had higher farm outputs than those with small herds. That means that it might be fruitful to look again at agriculture in pastoral areas. Intensification and expansion of agricultural activities, or other income-earning activities may actually strengthen the pastoral economy rather than weaken it.

Our results show that crop cultivation and livestock keeping reinforce each other (see Chapter 12). As we have seen, households with a high maize harvest are likely to have more livestock and productive farmers tend to reinvest in animals. This corresponds with findings of large-scale research carried out by Bourn & Wint (1994) who found a high correlation between livestock numbers and agricultural activities in Mali, Niger, Nigeria, Sudan and Chad between 1980 and 1993. Pastoralists with a farm benefit from crop cultivation because they do not need to deplete their herds when they are in need of grains. Promoting agriculture on Marsabit Mountain will also directly promote the pastoral production system as a whole, which is a realistic aim considering the rapid population growth. Development interventions should aim to increase food security through diversification, of which agriculture is just one option.

**Household use of forest and vegetation resources**

Human settlements and economic activities on the mountain are directly or indirectly linked to diverse functions of Marsabit Forest (Chapters 13 and 15). For example, forest products sold on the market alone accounted for 25 per cent of rural households’ annual income. This adds to the fuel wood for domestic uses by over 80 per cent of the rural and peri-urban households’, which is largely drawn from the forest. The forest ecosystem is also the single most important source of water for the urban population of Marsabit Town, for livestock and the majority of rural households on the mountain.

As seen in Chapter 13, the forest and woodland resources are equally crucial for the local economy, although the households rely more on the forest resources during the dry seasons. The dominant means of transport for forest and natural vegetation products continues to be humans, with the burden of transporting forest and woody resource harvests clearly falling on women and girls. While a limited number of households sell the vegetation products to earn income, the majority of the households (80 per cent) use the forest and woody vegetation resources for domestic needs. The harvesting of forest and woody vegetation products on the mountain complement household production from other activities like livestock keeping and arable farming.

Although the sample households affirm the use of the permit licence to harvest forest products, the differences in the amount of permit fees paid cast considerable doubts on the reliability of this assertion.

Regarding forest conservation, of particular concern today is the depletion of forest resources and a decline in forest conditions due to rapid exploitation rates. According to our estimates, about 118,600 metric tons of wood are harvested annually for household firewood use and making charcoal (in 2000). It is estimated that this demand is growing at a rate of 3
The amounts of annual fuel wood yield from forests (like Marsabit Forest) compared to the natural regeneration rates imply that the current wood extraction by the households clearly exceeds the potential fuel wood production of the forest reserve prescribed in the literature (about 21 per cent). While we acknowledge that the clearing of the woody vegetation cover on the mountain for farming is partly compensated for through the tree-planting efforts of the households and the Forest Department, tree survival rates have been shown to be low and severely hindered by droughts. Another threat to forest resources is the selective harvest of specific tree species of high market value and trees resistant to termites and rodent attack. The latter is a particularly important preference when trees are harvested for timber poles used for the construction of semi-permanent houses.

Although access rules to forest products are based on undifferentiated permit fees for the harvest of firewood and material for making charcoal, our estimate shows different impacts that the harvested products might have on the vegetation cover. In addition, the monthly permit fee charged for harvesting forest products is paid back in a single firewood collection trip. This suggests an undervaluing of forest resources from the Marsabit Forest Reserve. Despite indications that the present level of household harvests of forest products exceeds the potential wood yields, we found that only a small number of households adopt energy-saving devices. Furthermore, there is evidence that around Marsabit Town trees are being planted to improve the value of land rather than for woodlot development. Apparently, tree planting in and around Marsabit Town partially compensates for woody biomass loss and improves the vegetation cover on the mountain in general.

It is worth noting that the benefits of forest conservation on the mountain accrue differently to the households from different areas. The households on the eastern side of the mountain clearly seem to have better crop yields compared to the households on the south-western side of the mountain. Similarly, some households on the mountain have superior access to the piped water system from the source within the forest reserve and to micro-irrigation activities. The households connected to irrigation facilities are able to produce horticultural crops even during dry seasons. The unequal distribution of the benefits of conservation areas in general, and of the forest ecosystem in particular, has important implications for conservation projects. In addition to the benefits, the rural households also suffer crop losses and damage to properties and assets caused by wildlife. The households close to the protected forest reported higher property and livestock losses due to wildlife destruction (Chapter 13).

At ecosystem level, the households' harvest of forest products and clearing of woody vegetation cover for arable agriculture, although this is not accompanied by a proportionate increase in crop production, seem to reinforce each other in terms of reducing the capacity of the watershed on the mountain (Chapter 15). The present study's indications of over-use of forest resources and increasing harvesting of forest products might have negative consequences in the form of potential loss of forest ecosystem functions and services and biological resources. As we have argued previously, these problems might cause a thinning of the forest, accompanied by other human interference in the forest ecosystem. These problems should also be addressed bearing in mind the negative rainfall trends on the mountain. Today, the foremost conservation concern on the mountain is the aggregate demand for forest and woody vegetation resources. The problems in relation to the use of forest land and resources use relate to the increasing exploitation by households and commercial enterprises, dry-season
grazing, watering livestock in the forest and forestland conversion to urban settlement. An important reason for addressing these problems is based on the hydrological services of the forest and its support of species diversity and farming. Closely related to this is the fact that local communities could benefit from the presence of the forest when it leads to public participation in decision-making regarding conservation policies.

The protected areas and forest ecosystem services on Marsabit Mountain

The forest ecosystem on the mountain plays a critical role in the direct or indirect support of human livelihoods and species biodiversity. We studied forest-related issues mainly because the forest and woodland ecosystems offer various goods and services. The present study paid special attention to the forest ecosystem services and focused on the integration of economic and ecological approaches of protected areas. We also addressed how these issues relate to the management and conservation of forest ecosystem resources (Chapters 9, 13 and 15).

The forest on the mountain creates positive externalities in the region, with characteristics of both a private good (household or individual use of forest resources for one’s own benefits) and a public good (benefits from the presence of forest resources and conservation that accrue to the community on the mountain as a whole). In other words, the forest supports a wide range of indirect functions which benefit the local community as a whole (e.g. the influence of the forest on rainfall and subsequently farming activities). The forest also provides various products that are harvested and used for private benefits by households. Yet the harvest of forest products and/or the removal of the woody vegetation cover might have adverse consequences for the forest ecosystem functions in the long run. Considerable caution is required.

The forest reserve and other protected areas around the mountain are special legal status areas (Chapter 9). Even so, three issues challenge the effective management of the protected areas on the mountain and the principle goals of their creation. First, the vagueness of the boundaries of the protected areas is a source of conflict with regard to the use of the protected areas’ resources. Secondly, the protected areas generate economic revenue which is well below the management costs and this puts severely constrains on conservation efforts. Thirdly, the Forest Department (FD) and Kenya Wildlife Service (KWS) have overlapping roles in managing the protected areas and differences in the remuneration and expertise of the employees seem to block proper coordination of the shared conservation responsibilities. These three aspects form a link between the economic and political decision-making process, but are often neglected in addressing conservation matters. In Kenya, the law as a management tool of various environmental resources (e.g. water, forest, farmland and wildlife) is sector-based and poorly coordinated in practice. This approach challenges the enforcement of resource policies and brings about ineffective management of the protected areas, while environmental regulations and effective management are crucial to the political decision-making process. Therefore, there is a crucial need for better coordination of disjointed environmental policies, taking account of the forest’s ecological functions, the need to conserve resources and the forest’s support of especially forestry, agriculture, water resources and biodiversity. The foremost challenge in natural resource management in Kenya is not to establish a legal institutional framework, but to improve the poor coordination of policies in practice. Thus, there is an urgent call to resolve the current mismatch between
resource policies and management issues at local level, while at the same time reconciling such issues with the local demand for environmental resources.

**Access, use and management of water resources**

The study of water use and the accessibility of the various water resources on Marsabit Mountain (Chapter 8) showed that there is no inequality in access rights to water. Everyone, irrespective of ethnic identity has a guaranteed potential use right to the water resources on the mountain. However, the local institutions and management regimes are unable to solve the problems of unequal distribution of water resources in the region. Large parts of the mountain are occupied by very poor households that have settled in the ecologically more marginal areas and who, in turn, have no access to land closer to water resources. This group of water resource users has to cover long distances to access water. Therefore, although households have generally equal access rights to water, the spatial distribution of water sources and households on the mountain dictate water accessibility and use at household level. It means that even though there is equality in access rights to water and even though the traditional water-allocation mechanism is still intact, there is no guarantee that people’s livelihood needs will be met. Despite population growth and sedentarisation, the social institutions that govern the water resources have survived, but this may not guarantee the survival of the poorest in society.

In the lowlands, access to pasture is limited by accessibility or the availability of water sources, especially during the dry season. Therefore, the spatial distribution of water sources affects effective use of rangelands by the pastoral households and their herds (Chapter 16). In turn, the assumed negative potential effect of livestock numbers on the changes in species composition of the vegetation biomass in the rangeland has had major and often negative consequences for pastoral development and interventions. However, changes in annual rainfall do not seem to provide an adequate explanation of the changes in livestock numbers. This finding conforms to the disequilibrium model of arid rangeland ecology, where rainfall variability and vegetation patchiness dominate the direct coupling of annual rainfall and livestock populations.

**Main findings of the study**

**Sedentarisation reconsidered**

As a result of our study, new facts have emerged on sedentarisation and it has become clear that the present perception among scholars and development workers on sedentarisation should be reconsidered. Before 1980, the sedentarisation of nomadic pastoralists was generally considered a viable solution to problems in Africa’s drylands by development thinkers, governments and missionaries. After 1980, this perception on sedentarisation and pastoral mobility changed. It became widely accepted that pastoralism is a sustainable use of the drylands and that sedentarisation of pastoral nomads caused more problems than they solved. In the past, missionaries and development organisations in northern Kenya helped impoverished pastoralists to settle, but these efforts have been widely criticised in the literature. Scholars and present development organisations emphasise the importance and
efficiency of a mobile pastoral lifestyle and seem to agree on the view that sedentarisation is not a good solution to problems in the African drylands. They also think that the scarcity of resources, which would be exacerbated by sedentarisation, induces violence among the various ethnic groups in the region.

Because sedentarisation of mobile pastoralists in current mainstream approaches is not considered a solution to the problems of the drylands, but is instead seen as a process that should be discouraged, this study was initially influenced by assumptions that were based on this negative idea about sedentarisation. However, many of the assumptions on which this negative attitude is based appeared erroneous and we demonstrated that the common objections against sedentarisation do not apply to Marsabit District. The process in Marsabit District was exceptional in many ways. In the first place, sedentarisation was not stimulated by the British colonial government. Even though some people were allowed (and invited) to settle, they could only do so if they engaged in agriculture or trade. The number of people and animals in the Marsabit Mountain area was purposely kept low, for fear of disturbance of the fragile ecology on the mountain. In the second place, the settlement projects that were undertaken by the missions in the late 1970s were only meant for impoverished pastoralists who had already settled in Marsabit Township. Thirdly, there was no evidence of widespread resource degradation, nor that farming closed off water resources to pastoralists forever. Even ethnic violence does not seem to have increased in intensity and frequency. Neither can it be linked to scarcity of environmental resources (Chapter 17).

No evidence of an environmental tragedy
It has often been mentioned that sedentarisation of pastoral people is detrimental to the environment because the animals kept by settled people overgraze the pastures in an area where they should be mobile. Moreover, a concentration of people who need fuel wood for cooking was thought to deplete the scarce forest vegetation in the marginal zones surrounding the settlements. It was therefore assumed that the forest resources in the Marsabit Mountain area would become drastically degraded and depleted, and that the forest would be increasingly pressurised by growing populations.

The forest on the top of Marsabit Mountain was demarcated and protected by the English Colonial Government. In the 1930s and 1940s, the colonial government observed severely stressed conditions of the mountain ecology and also affirmed the drying up of the small crater lakes on a number of occasions. In response, the colonial administration, in particular, implemented a number of measures following the apparently stressed mountain ecology and forest conditions (Chapters 8 and 9). Among other measures, they erected a moat around the forest boundary to stop forest fires, constructed an electric fence (probably) using diesel-run power around the forest, extended the protected forest boundary, planted trees, piped water outside the forested areas into the open savanna for several local uses and restricted livestock use of the forest except for water consumption and use subject to concessions.

The ancient montane forest seems to have actually grown in size over the last half century despite the fact that the population grew from about 200 in 1930 to 37,000 in 2000. There are indications that until 1940 the mountain was less densely forested than at present. The frequent and intense forest fires that were common in the past do not occur anymore. In addition, agricultural activities often resulted in the planting of life fences and a range of tree
species in areas where before there were only dusty plains. Evidence from archival sources also shows that even the water table on the mountain is higher than during the colonial time. Moreover, the small crater lakes did not dry up during the recent droughts on the mountain and the forest seems to have become denser owing to the protective measures instituted by the (Colonial) government.

It should also be kept in mind that even though people settle, it does not mean that livestock is permanently settled on the mountain as well. The larger a herd becomes, the more it is herded outside the settlement areas. Only very poor people who cannot even send their animals to join other herds have to herd their animals close by. There is no evidence that sedentarisation in the Marsabit Mountain area has resulted in widespread environmental deterioration. Despite human and livestock population increases on the mountain and localised gully erosion, especially along cattle tracks, the settlement has not induced widespread deterioration of the mountain ecology to date. On the contrary, vast areas of barren no-man’s land, where people started living, were planted with bushes, trees, life fences and food crops. Tree planting has had positive effects on wind erosion and has resulted in increased agro-diversity.

This finding does not, however, mean that the environment should not be better-protected and taken care of. Even though sedentarisation should not be an environmental issue per se, the environment remains an important variable especially in fragile ecologies. Marsabit Mountain has a unique ecology because of the presence of its montane cloud forest amid arid and semi-arid areas. On the other hand, people cleared bush land for cultivation and cut trees for fuel and construction. This is presently having a damaging impact on the margins of the forest.

No socio-economic failure after sedentarisation

It was initially assumed that impoverished pastoral people would all long to go back to a pastoral way of life. This assumption was based on some existing romanticised pictures about the pastoral lifestyle, as if all pastoral communities would share their resources and restock their impoverished relatives. There were studies on settlement schemes that pictured them as social and economic failures, where poverty and relief food dependency would be higher than in the villages where pastoral destitutes settled spontaneously.

Our findings cannot verify the idea that sedentarisation of pastoralists in settlement schemes causes more poverty and misery. A socio-economic comparison between households in the settlement schemes and those outside the schemes (Chapter 5) showed that even though the people in the schemes were relatively disadvantaged at the time they arrived on the mountain, they engaged in more restocking efforts, attained higher literacy levels and higher cash incomes than households who had settled outside the schemes. In addition, most settled pastoralists in the Marsabit Mountain area actually did not want to return to a mobile life. The perception the people had of the changes in their lifestyle was not as negative as has been portrayed in the literature. Of course, our research focused on a population that had already sorted itself out: those who wanted a pastoral life and who were able to restock had already gone back to a nomadic way of life and most settled families had relatives who herded animals somewhere. Those who stayed behind valued ‘modern’ services like education, health services and access to the market. Impoverished pastoralists do not romanticise the
traditional lifestyle because it is exactly that lifestyle that sorted them out and left them without a social safety net. Therefore, they are the last ones who miss the so-called traditional socialism in pastoral communities, because they could not count on that system when they were most in need of it, otherwise they would not have settled.

The settlement schemes in the Marsabit Mountain area vary in their performance. In some schemes, 'mobility' was high and the present inhabitants are not the impoverished pastoralists for whom the schemes were originally meant. This can, however, easily be seen as a success because those who managed to restock have moved away and were replaced by others who tried farming. In other schemes, the original families that were slum dwellers before living in the settlement schemes were still there. In these schemes, families today have a higher literacy level, higher average cash incomes and have engaged in more restocking efforts than the families that settled under the same conditions outside the settlement schemes. It is interesting to note that the number of female-headed households was much higher in the settlement schemes than among the families outside the schemes. In addition, it was clear that the families in the schemes had fewer animals at the time they arrived on the mountain than those outside the schemes, which shows their greater vulnerability compared to the settlers in the spontaneous settlements. It is certainly true that the people who were settled in the settlement schemes were extremely poor at the start, but their poverty was not caused by them being settled. Poverty caused them to settle in the slums of Marsabit Town. It was after their impoverishment that they were helped and settled by the mission. There is no nomad in Marsabit District who was forced to settle, unless it was because s/he had lost her/his herds.

No evidence of increased ethnic violence
It was assumed that scarcity of natural resources would negatively influence ethnic relationships and result in an increasing number of violent deaths. The fact that an increasing number of people have to live in close proximity to their traditional enemies, competing over access to the same resources, would provide the necessary conditions for ethnic clashes. Not only were conflicts expected to increase between pastoral groups that were traditional enemies but also between farmer and pastoralist communities. The individualisation process of common property resources in the transition towards a private property regime would increase tension between farmers and herders. It is often mentioned that settled farmers close off important pastoral resources like water.

Our study cannot support these assumptions (Chapter 17). We found that even though ethnic violence has increased in absolute numbers of incidents (not in numbers of violent deaths), the population has grown more. That means that in relative terms the number of violent incidents and deaths per 1,000 inhabitants has decreased over the last century. Scarcity of natural resources does not, therefore, result in increased violence. This is a remarkable finding, considering the position of the study area so close to the Ethiopian and Somalian border. Taking into account the history of ethnic violence and the present context of population growth, changing lifestyles and increasing pressure on resources, one would indeed expect an increase in ethnic conflicts. However, there is no evidence to support this. The explanation for the finding that the response to changes in lifestyle and production systems was not a violent one can partly be found in the presence of social institutions that are still strong and persistent features in the society. During times of environmental stress,
wealthy livestock owners move away from areas where natural resources are too scarce for their livestock. Poor people who are left behind reconcile and cooperate to share the scarce vegetation and water in order to survive. Increased sedentariisation has resulted in a concentration of different ethnic groups on Marsabit Mountain. Although there is a likelihood that the ethnic groups contend for scarce resources, there is no evidence that violent conflicts in the mountain area are increasing or are scarcity induced. For example, interethnic sharing of water sources in the height of drought is more common than fights over water. In 2000, the Samburu/Rendille, Gabra, Burji and Boran shared waterholes at Hula Hula, Karantina and Bakato among others. The present vagueness as regards property rights permits flexibility in access rights to key natural resources on the mountain. If a process of privatisation replaces the current flexibility and vagueness in resource tenure, then an increase of violent conflicts is likely to emerge.

Part of the finding that increased scarcity of natural resources does not result in more violence can be explained by the role of ethnicity. Our study seems to contradict studies that attribute a lot of explanatory power to ethnicity. In Marsabit District, ethnic divisions are not clear-cut and static. Individuals and families can have multiple ethnic identities that are merely facilitating access to resources rather than impediments, especially for poor people. In addition, natural resources that superficially seem to be defined along ethnic and territorial lines are often subject to legitimate claims from various ethnic groups. Property regimes are therefore organised in a non-exclusive way without them becoming an open access resource, so that everyone owns a guaranteed potential use right of the resource.

Power and influence in the allocation and use of resources are defined by wealth, age, gender and ethnic identity, of which wealth and gender are probably the most important determinants. In the past, wealth has always been determined by livestock numbers, although at present land, business assets and monetary capital are also important aspects in wealth classification. However, pastoral resources still play an important role within the settlements and resources like wells on the mountain are not closed off for use by livestock keepers. Impoverished pastoral households that typically have no, or only very few, livestock and whose members start farming – often women, with or without young children – hold the most marginal position in the settlements. They are presently often allocated land far away from water sources, so that the wells remain accessible for livestock. Access to water sources is therefore not a source of violent conflict between poor farmers and herders. Access to farmland is regulated in a non-transparent way, where access to social/political networks and livestock ownership seems to increase the chance of land acquisition. The ensuing conflicts over access to land (Chapter 6) and water (Chapter 8) are solved by a committee of respected 'elders' who have influence and hold an indigenous political position. Conflicts between the poor and the wealthy are therefore hidden and covered up and do not result in violence.

Nomadic pastoralism, poverty and sedentariisation

In our study we have argued that there is need to readdress the group of settled pastoralists, the reason being the increasing number of people that is involved, the often extreme poverty they face and the nature of the strategies that they employ in marginal areas in order to
survive. Lack of access to resources, a limited social network and the need to learn a new mode of production renders the impoverished pastoralists a very vulnerable group in a pastoral society. We argue that the settlements should get a much more active role in a pastoral development programme. ‘Pastoral development’ should have a regional approach which also incorporates people who have no livestock and all their livelihood strategies. This approach should have a broad development focus which also targets the asset-poor within the livestock sector and includes non-livestock-based strategies to generate income. Income-generating activities outside the pastoral realm can thus be relevant to the development of the pastoral economy in the region.

According to mainstream definitions of pastoralism, herding families that have low herd sizes and that have to complement their resources with other activities are not considered to be pastoralists. As a result, they are often not considered a target group for pastoral development help. For their part, the pastoral households have seen herd sizes decline and, perhaps because of this, a weakening of the traditional institutions of herd sharing and of assisting the poor among them. As a consequence of the problems of defining pastoralism and the seemingly weak institutions of herd redistribution, the impoverished pastoralists are presently marginalised by both development agencies and their own kin, who also do not perceive them as ‘one of us’ anymore. Therefore, a broader definition of pastoralism is needed – one that takes into account that livestock is also social capital. Having animals in itself may mean that important social requirements for survival are met and that people have access to the social capital in their society. For their self-identification as pastoralists they do not need livestock (products) to be at least 50 per cent of their total domestic production. We therefore based our study on the sustainable livelihood approach because it allows us to look at the importance of several forms of capital and the way a livelihood is achieved through the availability and accessibility of various resources.

A regional development approach is needed that acknowledges the fact that livestock keeping is a sustainable use of the drylands, but that admits that pure pastoralism as a mode of production might not be sustainable for all the inhabitants of the drylands. In addition, accepting the fact that pastoral settlements are there to stay does not mean that nomadic pastoralism should be further discouraged. On the contrary, strong support of pastoralism as a mode of production is needed, although it cannot be assumed that this production system can cater for all people in the drylands. Our study has shown that nomadic pastoralists can take care of poor pastoral households, albeit to a limited extent. Some redistribution of animals does take place through herd-sharing arrangements and animal gifting. However, it should not be assumed that the nomadic pastoral production system can take care of all the poor people who fail in the system. This can partly be explained by the fact that nomadic pastoralists do not produce enough surpluses for restocking relatives who become destitute. Our study has proven that the more animals one owns the more one can rely on others for sharing and gifting. The poorer households are increasingly excluded from this type of social capital. Female-headed households outside the settlement schemes, in particular, seemed to have fewer animals at the time of settlement and they were often assisted less by relatives, friends, neighbours and development organisations.

That means that other institutions (governmental, non-governmental, commercial or missionary) should take the responsibility to help them. Care and support of the impoverished
pastoral households in Marsabit District will thus strengthen the nomadic pastoral production system at the same time, because it will allow nomads to use their own resources. At a later date, impoverished pastoralists will rebuild their herds, thus restoring the connections they may have had with other pastoralists. Economic strength in the settlements will also improve market conditions for nomadic pastoralists.

It has been demonstrated in the literature that destitute pastoralists usually invest income earned from other sources in livestock and it would be safe to assume that all families will, to a certain extent, invest in livestock. It is also true that not all members in one family or household in a region will deploy the same strategies, yet their income from various sources will be relevant in terms of reducing vulnerability to extreme changes and in contributing to pastoral wealth.

One way to add to income opportunities for poor people on the mountain is to make better use of the forest resources. However, this is a controversial issue as it might destroy the forest resources and its ecological and indirect economic value for a large number of people. As we argued earlier, the most important objective of nature conservation is to benefit society as a whole, as opposed to benefitting the individual. On the basis of the current study there are mixed results about the condition of the protected areas on the mountain. On the one hand, it appears that the forest density has increased over the last century. On the other hand, the forest now seems to be threatened by local uses and other activities associated with increased human settlement on the mountain. The available information indicates that the forest ecosystem’s resources, including forest and wildlife, are under pressure and that the natural resources need better protection at present. To this end, the differences in households’ asset holdings on the mountain and their economic differences in demand for the protected (forest) resources should be central to decision-making concerning management and conservation issues. One option for achieving this is through deliberate poverty reduction efforts targeted at the poorest households in order to improve their economic means and reduce their need to exploit forest resources.

There is no doubt that the trend towards reduced mobility for a number of people in the region and on the mountain, in particular, will continue. A crucial question is to what extent Marsabit Mountain can host more impoverished pastoralists in the future. Do we assume that the natural resource base of the mountain is a limiting factor or is the stock of resources dynamic and adaptable? Each component (forest, rangeland, arable land, water) must be assessed as to its potential for more intensive exploitation. Evidence from our own research shows that the stock of resources is, to a certain extent, dynamic and adaptable, and that the current limiting factors are capital, labour and unequal access to resources and formal education.