Pro-Poor
Livestock
Policy
Initiative

Policies and Strategies to Address the Vulnerability of Pastoralists in Sub-Saharan Africa

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PREFACE

This is the 37th of a series of Working Papers prepared for the Pro-Poor Livestock Policy Initiative (PPLPI). The purpose of these papers is to explore issues related to livestock development in the context of poverty alleviation.

Livestock is vital to the economies of many developing countries. Animals are a source of food, more specifically protein for human diets, income, employment and possibly foreign exchange. For low income producers, livestock can serve as a store of wealth, provide draught power and organic fertiliser for crop production and a means of transport. Consumption of livestock and livestock products in developing countries, though starting from a low base, is growing rapidly.

Although it is generally accepted that pastoralists in Sub-Saharan Africa will not supply much of the increased demand for animal products, investment in and policies for pastoral development are indispensable. This paper examines the causes and dynamics of poverty among pastoral populations in Africa and argues that sub-Saharan countries will not be able to achieve the Millennium Development Goals unless policy makers increase both their commitment to address the vulnerability of pastoral livelihoods as well as pursue strategies to support alternative income generation activities of pastoral people.

We hope this paper will provide useful information to its readers and any feedback is welcome by the author, PPLPI and the Livestock Information, Sector Analysis and Policy Branch (AGAL) of the Food and Agriculture Organization (FAO).

Disclaimer

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Keywords

Pastoralists, livelihoods, livestock, production systems, poverty, risk, vulnerability, markets, drylands, sub-Saharan Africa.

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ABBREVIATIONS

ALRMP	Arid Lands Resource Management Programme
AnGRFA	Animal Genetic Resources for Food and Agriculture
CBAHW	Community Based Animal Health Worker
CBHHW	Community Based Human Health Worker
CILSS	Comité Permanent Inter-Etats de Lutte contre la Sécheresse dans le Sahel
DFID	UK Department for International Development
ECOWAS	Economic Community Of West African States
EMPRES	Emergency Prevention System for Transboundary Animal & Plant Pests & Diseases
EWS	Early Warning System
FAO	Food and Agriculture Organization
FEWS	Famine Early Warning System
FSAU	Food Security Analysis Unit
GEF	Global Environment Facility
GPP	Global Pastoral Programme
GTZ	Gesellschaft für Technische Zusammenarbeit
ILO	International Labour Organization
ILRI	International Livestock Research Institute
ITDG	Intermediate Technology Development Group
IUCN	International Union for Conservation of Nature and Natural Resources
LDPS	Livestock Development Support Programme
LEWS	Livestock Early Warning System
OIE	World Organisation for Animal Health
PARIMA	Pastoral Risk Management Project
TAD	Transboundary Animal Diseases
UNCCD	United Nations Convention to Combat Desertification
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
USAID	US Agency for International Development
WAMIP	World Alliance of Mobile Indigenous People
WHC	World Herders Council
WISP	World Initiative for Sustainable Pastoralism
WTO	World Trade Organisation

1. EXECUTIVE SUMMARY

Introduction

Pastoralism is the key agricultural production system in the drylands. As drylands constitute nearly half of the land area of sub-Saharan Africa, pastoralism is of particular importance for the continent and in some countries pastoralists even represent the majority of the population. This notwithstanding, most governments of countries with pastoral populations are reluctant to invest in pastoral production systems, pastoralism being regarded as backward with little potential for improvement. The FAO Pro Poor Livestock Policy Initiative aims to contribute to poverty reduction among livestock keepers by supporting the formulation and implementation of policies, which improve their livelihoods, and this paper intends to provide an overview of policy options, which can mitigate the vulnerability of pastoralists and / or facilitate income diversification and adoption of alternative livelihoods.

Pastoralism in Sub-Saharan Africa

Given that non-traditional sources of income are becoming increasingly important for livestock keepers practicing communal grazing in dryland areas, this paper defines pastoralists and agro-pastoralists as people making a living in drylands and obtaining a given percentage of their gross agricultural as opposed to total income from livestock.

By combining data from various sources, it is estimated that there are about 120 million pastoralists/agro-pastoralists worldwide, of which 50 million reside in sub-Saharan Africa (SSA). Within sub-Saharan Africa, Sudan and Somalia have the largest pastoral/agro-pastoral populations of seven million each, followed by Ethiopia with four million.

The number of livestock in the pastoral/agro-pastoral production systems in sub-Saharan Africa was estimated by overlaying the livestock production systems maps with livestock density maps. The largest number of pastoral/agro-pastoral livestock is found in East Africa. Within East Africa, Sudan has the largest numbers of pastoral/agro-pastoral livestock comprising an estimated 18 million cattle, 18 million goats and 22 million sheep. In West Africa, the number and proportion of animals in pastoral/agro-pastoral production systems is lower than in East Africa. In West Africa the largest numbers of livestock kept in pastoral/agro-pastoral production systems are found in Niger (1 million cattle, 6 million goats, 4 million sheep) and in Mauritania (1 million cattle, 4 million sheep and 6 million goats).

Estimating meat production from pastoral/agro-pastoral livestock and relating it to total national meat production reported in FAOSTAT shows that in Djibouti, Somalia, Eritrea, Sudan, Western Sahara, Niger, Mauritania, Benin, Chad, Guinea-Bissau, Guinea and Mali pastoralists/agro-pastoralists not only own a major proportion of the national herd but also contribute a significant share to national meat production.

Worldwide, pastoralists constitute one of the poorest population sub-groups and among African pastoralists/agro-pastoralists the incidence of extreme poverty ranges from 25 to 55 percent.

The Vulnerability of Pastoral Livelihoods

Examining the welfare of pastoralists by using elements of the sustainable livelihoods framework facilitates identification of the causes and dynamics of poverty among pastoralists. The livelihoods framework emphasizes that the overall livelihood of pastoral people depends on both access to assets, such as pasture, water, animal health services, markets, credit and education, and the environment in which these assets are combined for production and consumption purposes, namely the political, organisational and institutional infrastructure. Furthermore, the livelihoods framework sets the welfare of pastoralists in the dynamic context of risks, seasonal and long-term trends which affect assets and livelihood strategies and determine the level of vulnerability.

Following Dercon (2001), risks are defined uncertain events that can damage wellbeing. The uncertainty pertains to the occurrence, timing and magnitude of the negative event. Vulnerability denotes the lack of resilience to the occurrence of these uncertain events (risks), including long-term and seasonal trends; vulnerability, therefore, is not only an important dimension of poverty and deprivation, but also a potential cause.

The World Bank Development Report 2000/2001 classifies risks by the level at which they occur: (1) micro-shocks, often referred to as idiosyncratic, affecting specific individuals or households; (2) meso-shocks that affect specific groups of households within a region, and (3) macro-shocks that affect all households in a region. The latter two are referred to as covariant. Pastoralists face the natural covariant risk of drought; the idiosyncratic risk of human illness and the idiosyncratic risk of livestock diseases, which can turn into a covariant risk in case of an epidemic; the economic risk of exclusion from markets; and the social risk of violent conflict over increasingly scarce resources, which can turn into the risk of civil strife. This latter risk is amplified by the political risk of marginalization and the environmental risk of pasture degradation.

Given this multitude of risks and the extreme vulnerability of asset-poor pastoralist the paper emphasizes that policy makers need to invest in the development and implementation of risk management policies / strategies, while the long term trend of increasing human populations in the drylands needs to be addressed by strategies that support adoption of alternative income generation activities by pastoral/agro-pastoral people.

Risk Management Policies/Strategies

For policy making it is important to distinguish between idiosyncratic and covariant risks. The management of covariant risks often calls for public sector engagement and investment, while idiosyncratic risks are normally best dealt with by the household itself. Risk management strategies can be sub-divided into risk reduction, risk mitigation and risk coping strategies. In principle the preferred approach should be first to reduce the likelihood of risks, then to mitigate the negative impacts of a shock (i.e. a materialized risk), so that the need for coping strategies is minimized. This is not always possible however. While the outbreak of epidemics, violent conflicts and riots, or the degradation of pastureland can in theory be prevented, in the case of drought only risk mitigation strategies can be set in place.

Irrespective of the risk type, poor herders are more likely to end up with an unviable herd size than wealthier herders, even when they loose the same relative amount of livestock. Policy makers, therefore, should target risk-management strategies to particularly support the poorer livestock keepers, which are less likely to be able to absorb shocks without seriously depleting their resource assets. Public risk

management strategies should also be tailored to the diverse risks pastoralists/agro-pastoralists face.

Managing the Risk of Drought

An early warning system for drought in combination with timely market interventions and the establishment financial institutions can increase the ability of herders to transform those livestock which cannot withstand the stress of the drought into other assets such as cash, fodder or food grain. The development of forecasting technologies bears the opportunity to implement timelier movement/de-stocking/re-stocking strategies allowing pastoralists to maintain their breeding assets through crises. Risk coping strategies providing incentives for destitute pastoralists to invest in alternative income generating activities outside the pastoral sector not only help these pastoralists to cope with the loss of their main livelihood supporting activity, but also mitigate the negative effects of growing pastoral populations on shrinking rangelands.

Managing the Risk of Epidemic Animal Diseases

The risk of epidemic diseases potentially threatens all pastoralists. However, poor pastoralists are more vulnerable to this risk, as by living in remote areas they often lack access to veterinary services and do not have the means to purchase drugs for disease prevention and treatment. The introduction of community-based animal health workers (CBAHW) is a powerful measure not only to increase the coverage of preventive animal health services in sparsely populated areas, but also to provide curative services and preventive measures for non-epidemic diseases on a cost recovery basis. Additionally CBAHWs can be engaged by the public sector for disease surveillance and prevention campaigns against transboundary animal diseases. Recently, some innovative approaches have attempted to use community-based workers to provide advice both for animal and human disease. Preliminary assessments suggest that an intersectoral approach to human and animal health is a cost-effective strategy that can contribute to the alleviation of poverty and reduction of disease burdens, particularly suited to nomadic populations.

Managing the Risk of Market Exclusion

The main market risk policy makers should be concerned about is the exclusion of their nation states (or large segments thereof) from livestock export markets due to insufficient health standards and / or due to the loss of international competitiveness. The reduction of this risk needs attention not only because of the negative impact it has on the national economy but also because if local livestock keepers were able to participate in satisfying the demand for livestock products, they would increase their monetary income and thereby their capacity to handle other risks. Preventive health measures as well as the investment in quarantine stations and holding grounds provide a way to reduce the health risk leading to market exclusion, while the reformulation of health standards for marketing could mitigate the impact of that health risk.

Transport constitutes a major cost factor in livestock trading: livestock are trekked or trucked to markets, with trekking being the predominant mode of transportation in West Africa. However, trekking has high indirect costs due to animal mortality, weight loss, trekker time as a result of stock routes and watering points being mostly in bad conditions, and carries the risks of raids or conflict with farmers along marketing routes. The public sector should reduce the transport costs imposed on traders and pastoralists, e.g. by investing in transport infrastructure (roads, trekking routes and water points). Although livestock are one of the most repeatedly (and perhaps the most highly) taxed agricultural commodities in Africa, livestock taxes and

transit fees are rarely used to improve the physical structure or the efficiency of livestock markets. The governing principle should be to levy user fees and taxes on livestock producers and traders for visible, tangible services and for maintenances and upgrading of market facilities.

Managing the Risk of Violent Conflict

The risk of violent conflict, which can escalate into civil strife and war, negatively affects pastoralist livelihoods *per se* but also because it deters livestock keepers from investing resources in the management of other prevailing risks. Conflict management encompasses both conflict prevention and conflict resolution to mitigate the effects of conflict. Traditionally, the response to conflict was fixed on resolution. However, the policy paradigm is now shifting and there is a growing recognition that conflict prevention strategies are probably more effective than resolution-oriented strategies.

Conflicts can be prevented through the establishment and enforcement of rules over natural-resource use, collective acceptance of such rules, and continuous negotiation of diverging demands. The regulation of access to natural resources should aim both to prevent degradation and violent conflict. Community-based natural resource management including all user groups in the negotiation process about the rules of access is a promising option for conflict prevention between conservationists, pastoralists and farmers. The model of key-site management by community-based organizations is a promising option for sustainable range management, which can prevent conflict among pastoralists as well as between pastoralists and farmers.

Equally important are measures to overcome the widespread marginalization of pastoralists. On the one hand, understanding of pastoral livelihoods needs to be enhanced among non-pastoral groups, while on the other hand, the capacity of pastoral groups to promote their interests needs to be strengthened by giving them a voice in national and international policy fora. The process of decentralization, and the underlying concept of subsidiarity offers an opportunity to improve political stability and empower pastoralists. Pastoralist organizations can facilitate the inclusion of herders' concerns and needs in national development strategies: the Peul Association of Northwest Niger, the Fulani association in Nigeria and the Afar Pastoralist Development Association in Ethiopia (APDA) are examples of pastoralist organizations that enable herder's needs to be expressed at regional or national level. Pastoral people are also forming international organizations to defend their interests. Examples are the World Alliance of Mobile Indigenous People (WAMIP) and the World Herders Council / Conseil Mondial des Éleveurs. Giving these organizations a voice at international conferences and meetings will contribute to changing perceptions and policy decisions on rural development.

Diversification and Exit Strategies

Even if all above risks faced by pastoralists/agro-pastoralist are suitably managed, in the longer term their wellbeing would decline as a consequence of growing human and livestock populations on limited and often degradated drylands leading to increasing imbalances between the demand for and supply of land and water. Therefore, while individual impoverished pastoral/agro-pastoral households can be helped to regain a viable and sustainable livelihood in pastoral areas, this is no longer true for the pastoral/agro-pastoral population as a whole. Complementary policies / strategies with the objective to reduce the imbalance between humans, livestock and the environment therefore need to be put in place.

The policies / strategies to facilitate the engagement of pastoral people in alternative income generating activities should start from two angles. On the one hand

investment opportunities for pastoral people need to be identified followed by the creation of access to credit and training in order to enable pastoral people to pursue the investment opportunity. On the other hand public sector investment in labour intensive infrastructure provision could create employment opportunities for pastoral people, while incentives schemes to train and hire ethnic minorities including pastoral people might be established for the private sector.

Conclusions and Recommendations

In sub-Saharan Africa, any attempt to achieve the Millennium Development Goal of halving extreme poverty needs to include pastoral/agro-pastoral people. The crucial policy question is whether it would pay off to invest in pastoral development, or whether it would be more appropriate to design exit-strategies for pastoralists/agro-pastoralists allowing them to abandon livestock keeping.

Both of the above options should be pursued in parallel. On the one hand, the increasing pastoral/agro-pastoral populations on decreasing rangelands requires that policy-makers should develop and implement exit and/or diversification strategies for pastoral people. There are, however, also good economic reasons for investing in pastoral areas. First, pastoralism/agro-pastoralism is the best, if not the only, means to make productive and sustainable use of natural resources in arid and semi-arid areas that would otherwise remain unexploited. Second, pastoral/agro-pastoral people produce a large share of the meat supply in many countries of sub-Saharan Africa. Finally, although pastoral production systems achieve lower yields per animal than 'modern' ranching systems, pastoralism is more productive per unit of land than the latter.

In the course of centuries pastoralists have developed effective mechanisms to survive in this erratic and risky environment. Traditional risk-management strategies include livestock accumulation, regular and opportunistic herd movements tracking rainfall, breed and species diversification, and herd dispersion between community members. For a number of reasons these traditional risk management strategies have become increasingly ineffective over the past decades and poverty levels among pastoral populations have risen. However, if policies are set in place which address these risks, pastoralists cannot only continue to sustain themselves and dispose the resources of the waste rangelands, but also significantly contribute to the national economy. The challenge of governments, multilateral and bilateral agencies, development banks and the stakeholders themselves is to design and implement policies to reverse the negative processes impinging on the wellbeing of pastoral/agro-pastoral households and enable them to actively contribute to rural development and economic growth.

2. INTRODUCTION AND RATIONALE

Pastoralism is the key agricultural production system in the drylands. As drylands constitute nearly half of the land area of sub-Saharan Africa, pastoralism is of particular importance for the continent and in some countries pastoralists even represent the majority of the population. This notwithstanding, investment in pastoralist development has dropped over the last decades and is by no means proportionate to its potential economic contribution to local and national economies (Oygard et al. 1999; Rushton et al. 1999). Although it is recognized that scope for production and productivity increases of pastoral systems to meet the growing demand for livestock products is limited[1], investment in and policies for pastoral development are justifiable for a number of economic and social reasons:

- First, extensive grazing frequently is the only means to produce (high-value) agricultural products under the eco-climatic conditions of the drylands, and, although pastoral production systems achieve lower yields per animal than 'modern' ranching systems, pastoralism is more productive per unit of land than the latter (Scoones 1994 b; Bremann and de Wit 1983).[2]
- Second, of the estimated 120 million pastoralists worldwide, nearly one third can be classified as extremely poor, making pastoralists one of the world's poorest population sub-groups (see Section 3.3 for details). The commitment to achieving the Millennium Development Goal of halving poverty levels by 2015 carries the moral obligation not to by-pass pastoralists.
- The third justification for assisting pastoralists lies in the cost of not taking action (Pratt et al. 1997; Dobie 2001). Being exposed to the risks of drought, epidemic livestock diseases, market exclusion and violent conflict, pastoralists represent a particularly vulnerable group, and, given the limited opportunities for income diversification, pastoralists with a narrow asset base easily fall into poverty traps. The cost of required rehabilitation programmes will rise dramatically if no preventive interventions are pursued.

The FAO Pro Poor Livestock Policy Initiative aims to contribute to poverty reduction among livestock keepers by supporting the formulation and implementation of policies that improve their livelihoods. This paper intends to provide an overview of policies and strategies that can contribute to mitigate the vulnerability of pastoralists.

[1] Delgado *et al*. (1999) predict a massive increase in demand for food of animal origin between 1997 and 2020 as a result of urbanization, population growth and income growth.

[2] Rushton *et al*. (1999) point out that a relevant measure of 'productivity' should relate to the most limiting resource. For example, value of production per hectare is higher in pastoral production systems, whereas value of production per man-day is higher in ranching systems. However, as labour is not the major constraint in pastoral production systems production/man-day is not the most appropriate measure of productivity.

3. PASTORALISM IN EAST AND WEST AFRICA

3.1 Definition of Pastoralism/Agro-Pastoralism

Pastoralist households are commonly defined as households which obtain more than 50 percent of their total gross income (i.e. including the value of own produce consumed within the household) from mobile livestock rearing on unimproved, communal pastures. Households which obtain more than 25 percent but less than 50 percent of their gross incomes from livestock on communal grazing land and more than 50 percent from cropping activities are defined as agro-pastoral (Swift 1988). The above definitions however would exclude many destitute herders who rely on alternative income generating activities to supplement household income, because their herds have been decimated (Heffernan 2004; Baxter 1993; Morton and Meadows 2000). Given that non-traditional sources of income are becoming increasingly important for livestock keepers practicing communal grazing in dryland areas, this paper defines pastoralists according to the contribution of livestock to agricultural rather than total income and sets them in the agro-ecological context of drylands.

Drylands are defined by the UNCCD (1994) as arid, semi-arid or dry sub-humid areas, in which the ratio of mean annual precipitation to mean annual potential evapo-transpiration lies between 0.05 to 0.65[3]. They cover about 40% of the world's land surface and 54% of the world's productive land[4]. A characteristic feature of the drylands is the low but highly variable rainfall (inter-annual coefficient of variation of 25 to 35 percent), which makes them unsuitable for crop production. The outstanding features of pastoralism thus have to be understood as long-standing adaptations to the agro-ecological conditions of the drylands:

- High dependency on herbivorous livestock and the goods these generate as ruminants and other herbivores are the only practical means of transforming pasture and browse forage into food and income;
- Nomadic or transhumant herd movements on communal land as response to the erratic rainfall patterns.

This paper defines pastoralists as livestock keepers residing in areas which receive less than 400 mm of rainfall per year with a length of growing period of 0 to 75 days, where cropping is not practiced, and deriving more than 50 percent of agricultural from livestock rearing through opportunistic tracking on communal lands. Agro-pastoralists are defined as livestock keepers obtaining more than 25 percent but less than 50 percent of agricultural income from livestock keeping on communal lands in areas with an annual rainfall between 400 and 600 mm and a length of growing period of 75 to 90 days, where cropping millet and sorghum is possible[5] (See Map in Annex 1).

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[3] For example an area with an annual rainfall of 350 mm, will be considered as dryland if the potential annual evapotranspiration lies between 540 (350/0.65) and 7.000 (350/0.05).

[4] The world's productive lands include all areas except for the hyper-arid land areas, which have a ratio of mean annual precipitation to mean annual potential evapo-transpirationof less than 0.05 %.

[5] The form and degree of movement of pastoralists is used to further categorize pastoralists in nomadic, transhumant and sedentary pastoralists.

Nomadic pastoralism is characterized by high mobility and often irregular movement of people and livestock. In general nomadic pastoralists follow established migration routes. However, erratic rainfall and dynamic external conditions require a certain flexibility, which often leads nomadic pastoralists to deviate from the established migration routes.

Transhumant pastoralism is based on regular movements of herds between fixed areas to exploit seasonal availability of pastures. Transhumant pastoralists have often a permanent homestead, where the older members and the younger children remain throughout the year. 'Vertical movement' is the specific form of transhumance occuring in mountain regions.

Although this paper specifically addresses the problems faced by pastoralists, many statements and considerations also apply to agro-pastoralists.

Although pastoral production systems share common characteristics which distinguish them from other farming systems there are also differences between pastoral systems. Pastoralists for example tend different animal species and follow vertical or horizontal tracking strategies in adaptation to particular environmental and economic niches: camels are used in the driest areas, goats where shrubs and trees dominate, sheep on mountain or dry pastures too rugged for cattle, while cattle predominate in areas where open savannas provide decent grass cover and adequate water (Map 1).

Sandford (1983) uses the term 'pastoral situation' to denote a particular conjunction of pastoral people and land at a particular period of time. He distinguishes physical, social and economic, and political characteristics (Table 1) whose combinations determine specific pastoral situations and differentiate pastoral systems between each other and *vis-à-vis* other farming systems.

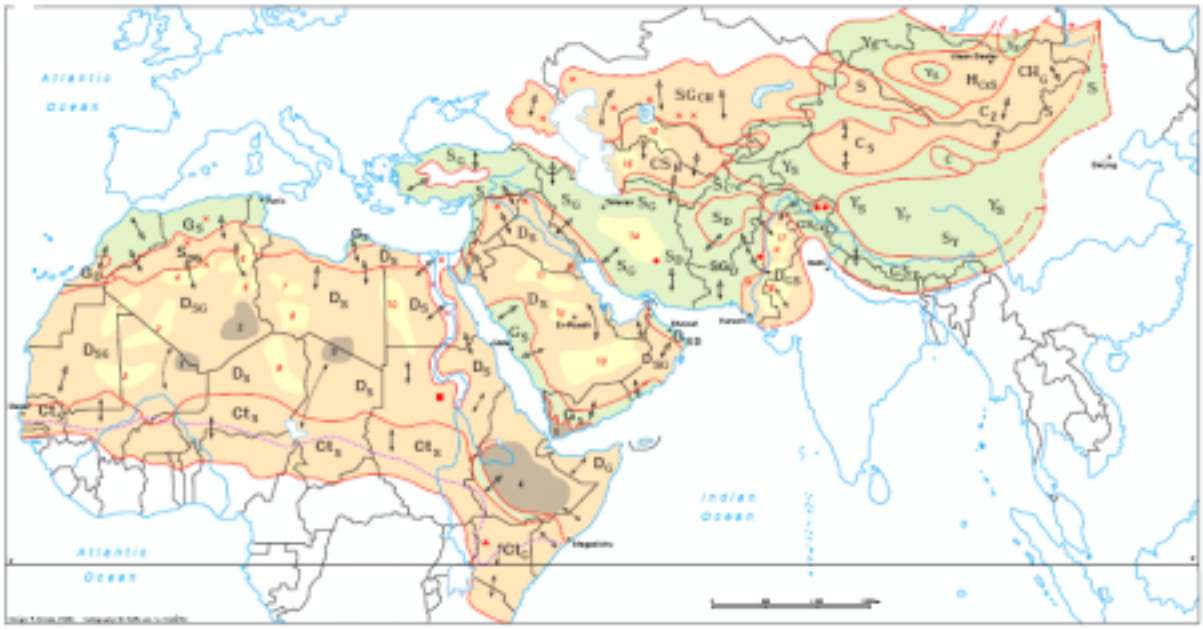
The issues and options discussed in this paper refer to the general characteristics of pastoral production systems. Specific pastoral situations are only referred to in the examples in boxes. These examples, therefore, should not be regarded as providing blueprints for all pastoral situations, but rather should be understood as guiding ideas for the development of policies, which have to be adapted to specific pastoral situations.

Table 1: *Characteristics of Pastoral Situations.*

Physical Characteristics	• timing, scarcity and unreliability of rainfall; • susceptibility of the soil to erosion; • accessibility of the area to modern forms of transport;
Social and Economic Characteristics	• population density; • degree of the dependence on livestock both for income and for basic consumption goods; • ease and terms of trade with which livestock products can be exchanged for other goods; • degree of mobility of the human population and their livestock; • nature of the existing social and economic system
Political Characteristics	• relative sizes and rates of growth of the pastoral and non-pastoral populations; • present and past political relations of pastoralists with non-pastoralists and with the national government; • degree to which a pastoral population straddles national boundaries

Source: Sandford 1983

Map 1: *Main Species and Migration Patterns in Different Pastoral Regions*



Source: Scholz 1996

3.2 Number of Pastoralists/Agro-Pastoralists, Livestock Numbers and Meat Production

Estimates of global numbers of pastoralists and agro-pastoralists are highly speculative and range from 100 to 200 million (World Bank 1998; Swift 2001). By defining pastoralists by their agro-ecological zone and their dependence on livestock one can use GIS modeling to estimate the number of pastoral and agro-pastoral people and livestock. A global dataset that can be used to estimate the number of pastoralists and agro-pastoralists worldwide is the spatial distribution of people by agro-ecological zones and livestock production systems developed by Thornton *et al*. (2002)[6]. This is

[6] The GIS maps produced by Thornton et al. (2002) are based on a global classification of livestock production systems proposed by Seré and Steinfeld (1996), who present a typology of mixed crop livestock systems, livestock-only rangeland-

the only one available for global comparison, even though the proposed livestock production and sub-production systems classification does not make it possible to clearly distinguish between pastoralists and agro-pastoralists. However, summing the number of people allocated to 'livestock-only grassland-based' production systems provides a rough estimate of the total number of pastoralists and agro-pastoralists when countries where ranching dominates in dryland areas are excluded from calculation (see table in Annex 2)[7]. This provides an estimate of a global total of 120 million pastoralists and agro-pastoralists (Table 2). With an estimated 50 million pastoralists/agro-pastoralists sub-Saharan Africa has the greatest number of pastoralists/agro-pastoralists worldwide.

Table 2: *Estimated number of pastoralists/agro-pastoralists in the different geographic regions (see Annex 3 for a list of countries within region).*

Region	Number of Pastoralists/Agro-pastoralists (million)	Proportion of Rural Population (%)	Proportion of Total Population (%)
Sub-Saharan Africa	50	12	8
West Asia & North Africa	31	18	8
Central-East Asia	20	3	2
Newly Independent States	5	12	7
South Asia	10	1	0.7
Central & South America	5	4	1
Total	120		

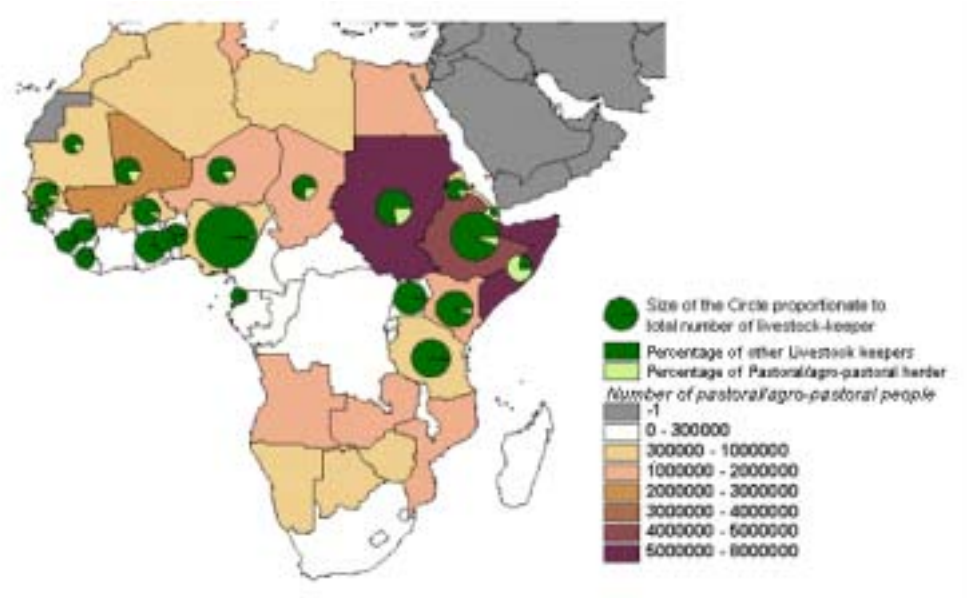
Source: Author's calculations based on Thornton et al. 2002

Within sub-Saharan Africa, Sudan and Somalia have the largest pastoral populations of seven million pastoralists/agro-pastoralists each, followed by Ethiopia with 4 million. However, while in Somalia pastoralists account for 97 percent of the total population, in Sudan they only account for 23 percent (Map 2).

based systems and landless production systems. Thornton et al. (2002) disaggregate the typology into 10 different livestock production systems. The production systems are defined in terms of climate, agro-ecological potential as described by length of growing period (LGP) and human population density supplemented by existing global coverages of crop lands, irrigated lands and city lights. Pastoral and agro-pastoral population numbers can be estimated by extracting values for both the 'livestock only grassland-based production systems' in the arid zone (LGA) and in temperate zones and tropical highlands (LGT). The LGA production system is defined as a production system based on rangelands in the arid-semiarid zone with a LGP of less than 60 days and a population density of less than 20 persons km². The grassland based system in temperate zones and tropical highlands (LGT) is a grazing system constrained by low temperatures. In the temperate zones, there are one or two months of mean temperatures (corrected to sea level) below 5°C, whereas in the tropical highlands daily mean temperatures during the growing period are in the range of 5 - 20°C. LGT in tropical highlands comprise parts of the highlands of South America and Eastern Africa. LGT in temperate zones include southern Australia, New Zealand, and parts of the United States, China and Mongolia. The arid and semiarid tropics and sub-tropics constitute the predominant zone of pastoralists and agro-pastoralists in Africa. Additionaly some pastoralists are found in the tropical highlands of East Africa representing the LGT system.

[7] For example while in the Sahel, grazing ruminants is the dominant form of land use in the 'livestock only rangeland-based production system' in the arid, semi-arid and the hyper-arid zone, in South Africa ranching is the prevailing production system in these zones.

Map 2: *Estimated number and percentage of pastoral/agro-pastoral people in West and East Africa*



Source: Author's calculations based on Thornton et al. 2002

The number of livestock in the pastoral/agro-pastoral production systems in sub-Saharan Africa can be estimated by overlaying the livestock production systems map of Thornton *et al*. (2002) with FAO livestock density maps (Geonetwork 2005). The estimated numbers and percentages of pastoral/agro-pastoral cattle, sheep and goats are depicted in Maps 3 and 4 and detailed in Annex 4.

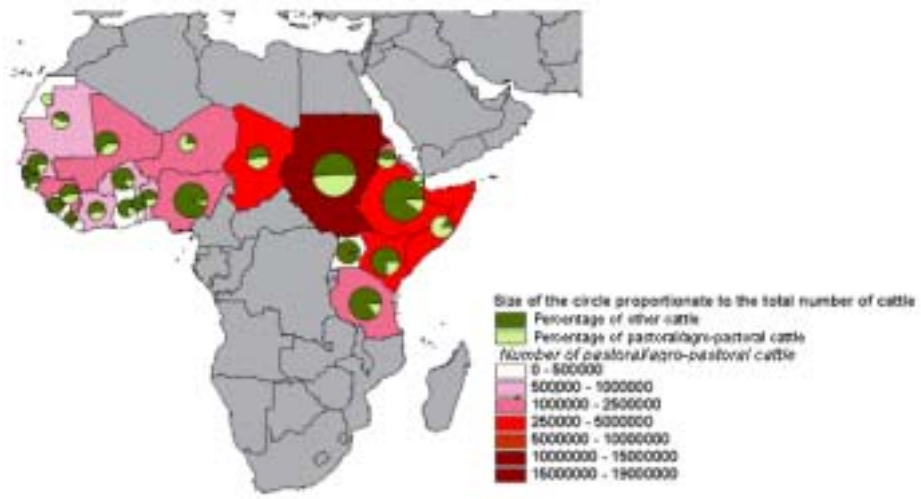
The largest number of pastoral/agro-pastoral livestock is found in East Africa. Within East Africa Sudan has the largest numbers of pastoral/agro-pastoral livestock comprising an estimated 18 million cattle, 18 million goats and 22 million sheep. The second largest population of pastoral livestock with around 4 million cattle, 13 million sheep and 11 million goats is found in Somalia. While in Sudan 50 percent of all livestock is held by pastoralists, in Somalia pastoralists/agro-pastoralists keep about 90% of all livestock.

In West Africa the number and proportion of animals in pastoral/agro-pastoral production systems is lower than in East Africa. In West Africa the largest numbers of livestock kept in pastoral/agro-pastoral production systems are found in Niger (1 million cattle, 6 million goats, 4 million sheep) and in Mauritania (1 million cattle, 4 million sheep and 6 million goats). A comparison of the proportion of pastoral/agro-pastoral people (Map 2) with the proportion of pastoral/agro-pastoral livestock (Maps 3 and 4) shows that in Sudan, Chad, Niger, Mali and Mauritania pastoralists/agro-pastoralists represent a small fraction of the population but hold a major share of the national herd.

The estimated livestock numbers in pastoral/agro-pastoral production systems provide a basis for calculating the annual output of pastoral/agro-pastoral livestock production by using the herd growth routine of the Livestock Development Planning

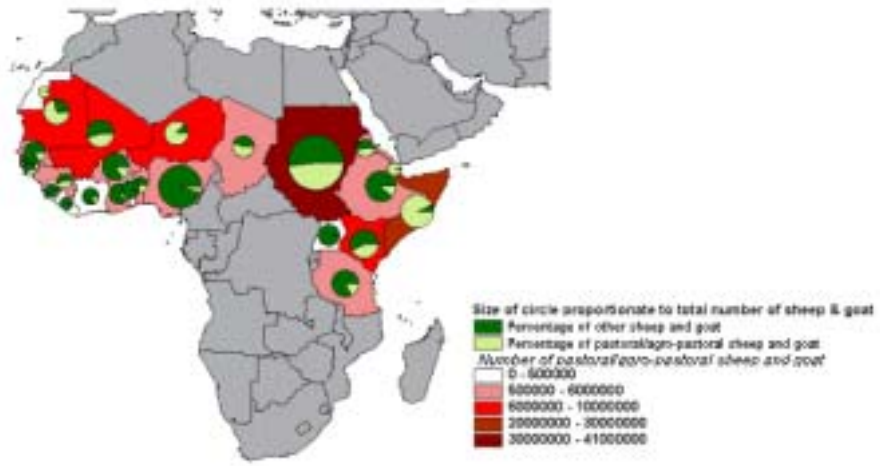
System Version 2 (LDPS2)[8] and the performance parameter values compiled by Otte and Chilonda (2002). Estimating meat production from pastoral/agro-pastoral livestock and relating it to total national meat production reported in FAOSTAT (see table in Annex 5) shows that in Djibouti, Somalia, Eritrea, Sudan, Western Sahara, Niger, Mauritania, Benin, Chad, Guinea-Bissau, Guinea and Mali pastoralists/agro-pastoralists not only own a major proportion of the national herd but also contribute a significant share to national meat production (Table 3).

Map 3: *Estimated number and proportion of cattle in pastoral/agro-pastoral production systems in West and East Africa*



Source: Author's calculations based on Thornton et al. 2002

Map 4: *Estimated number and proportion of sheep and goats in pastoral/agro-pastoral production systems in West and East Africa*



Source: Author's calculations based on Thornton et al. 2002

[8] LDPS2, developed by FAO (1997), is a quantitative livestock model designed to answer questions related to the capacity for meeting a given demand for meat and milk from various livestock production systems. The study of Otte and Chilonda (2002) classifies ruminant production systems in sub-Saharan Africa in two main categories: traditional (pastoral, agro pastoral and mixed) and non-traditional (ranching and dairy) systems and provides a summary of the performance indicator values reported for these systems in published and grey literature between 1973 and 2000.

Table 3: *Estimated total and proportional meat production from pastoral/agro-pastoral systems in West and East Africa (2002).*

East Africa	Cattle Meat		Goat Meat		Sheep Meat	
	Pastoral Production	Percent of national production	Pastoral Production	Percent of national production	Pastoral Production	Percent of national production
Djibouti	2,840,763	99%	1,118,748	97%	820,554	99%
Eritrea	13,333,998	58%	1,751,832	38%	1,887,448	38%
Ethiopia	39,254,569	14%	3,006,528	12%	1,839,164	7%
Kenya	33,951,774	34%	10,135,336	42%	5,561,651	33%
Somalia	51,365,707	91%	25,471,753	93%	23,159,968	94%
Sudan	213,561,380	49%	42,140,927	42%	40,016,191	38%
Tanzania	27,021,510	15%	4,389,184	15%	1,060,654	13%
Uganda	3,035,536	5%	249,291	1%	68,889	3%
Total	38,4365,237	46%	88272599	42%	74414519	41%

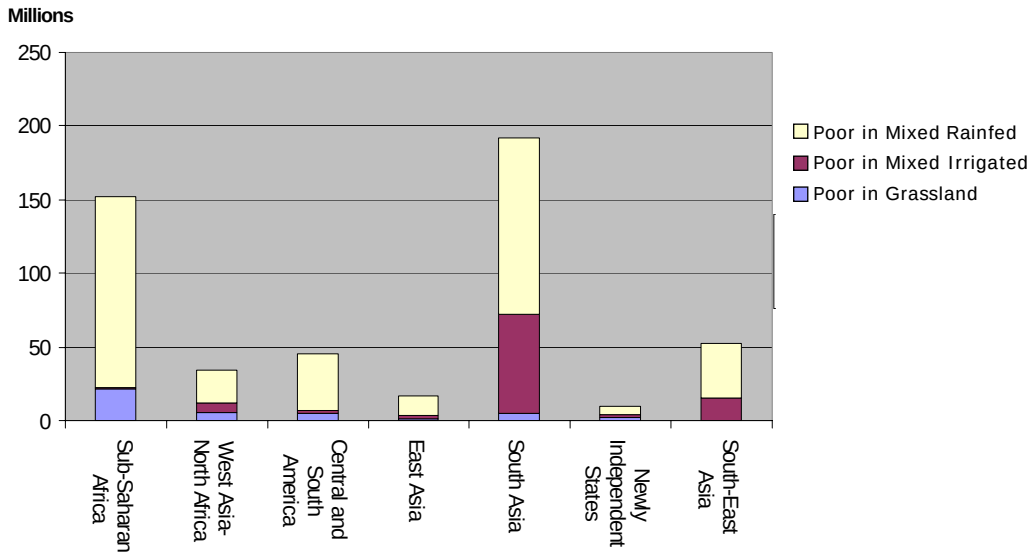
West Africa	Cattle Meat		Goat Meat		Sheep Meat	
	Pastoral Production	Percent of national production	Pastoral Production	Percent of national production	Pastoral Production	Percent of national production
Burkina Faso	9,258,841	18%	3,684,352	15%	1,728,867	9%
Chad	31,226,264	49%	6,658,882	50%	2,360,544	44%
Cote d'Ivoire	7,273,231	36%	481,716	16%	333,606	12%
Gambia	199,441	5%	30,213	8%	9,378	3%
Ghana	3,107,105	18%	771,306	9%	385,770	7%
Guinea	14,074,627	39%	1,047,547	41%	635,041	40%
Guinea-Bissau	2,178,687	42%	132,899	19%	201,541	47%
Mali	27,908,746	38%	9,761,685	38%	5,273,901	36%
Mauritania	9,932,539	60%	8,371,650	66%	10,153,211	60%
Niger	13,421,365	78%	13,071,666	83%	6,892,218	83%
Nigeria	16,944,859	8%	3,014,727	4%	2,210,143	4%
Senegal	7,729,404	24%	1,227,109	11%	1,565,278	13%
Togo	108,926	4%	27,177	1%	20,363	1%
Western Sahara	980	100%	395,600	100%	59,400	100%
Total	143,365,015	37%	48,284,885	33%	31,423,262	33%

3.3 Number of Poor Pastoralists/Agro-pastoralists

Estimates of the number of poor pastoralists/agro-pastoralists worldwide can range from 35 million to 90 million depending on the definition and measure of poverty used (see table in Annex 6). Combining the World Bank rural poverty rates (World Bank 2001) with studies on livestock ownership by LID (Ashley *et al*. 1999), Thornton *et al*. (2002) estimated that worldwide around 560 million livestock keepers live in extreme poverty, of which around 40 million are pastoralists/agro-pastoralists.. Although the number of poor pastoral/agro-pastoral livestock keepers is low compared to the estimate of poor livestock keepers operating in *mixed irrigated production systems* (365 million) or in *mixed rainfed production systems* (103 million) (Fig. 1), the

incidence of poverty is highest among pastoralists/agro-pastoralists, reaching around 30 percent, whereas in mixed rain-fed and mixed irrigated systems this incidence is about 20 and 5 percent respectively.

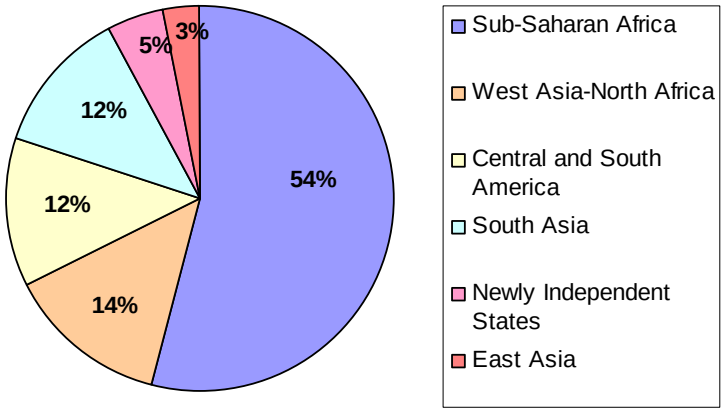
Figure 1: *Estimated number of poor livestock keepers by livestock production system and region.*



Source: Author's calculations based on Thornton et al. 2002

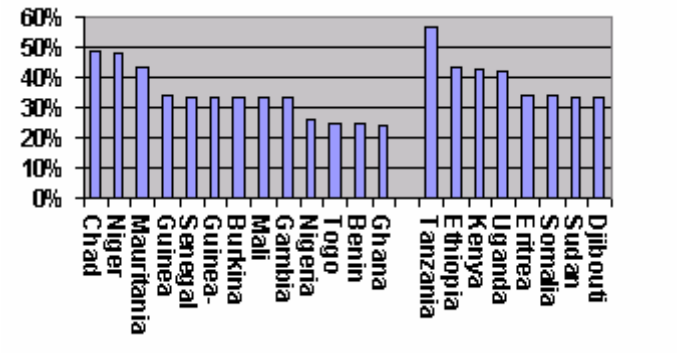
Sub-Saharan Africa is not only outstanding because with 50 million pastoralists/agro-pastoralists it has the greatest share of the world's pastoralists, but also because the majority of the world's extremely poor pastoralists/agro-pastoralists (54%) reside in the region (Fig. 2). Within the different countries in sub-Saharan Africa poverty incidence among pastoralists/agro-pastoralists ranges from 25 to 55 percent (Fig. 3).

Figure 2: *Regional distribution of the world's poor pastoralists.*



Source: Author's calculations based on Thornton et al. 2002

Figure 3: *Poverty incidence of pastoralists in sub-Saharan Africa.*



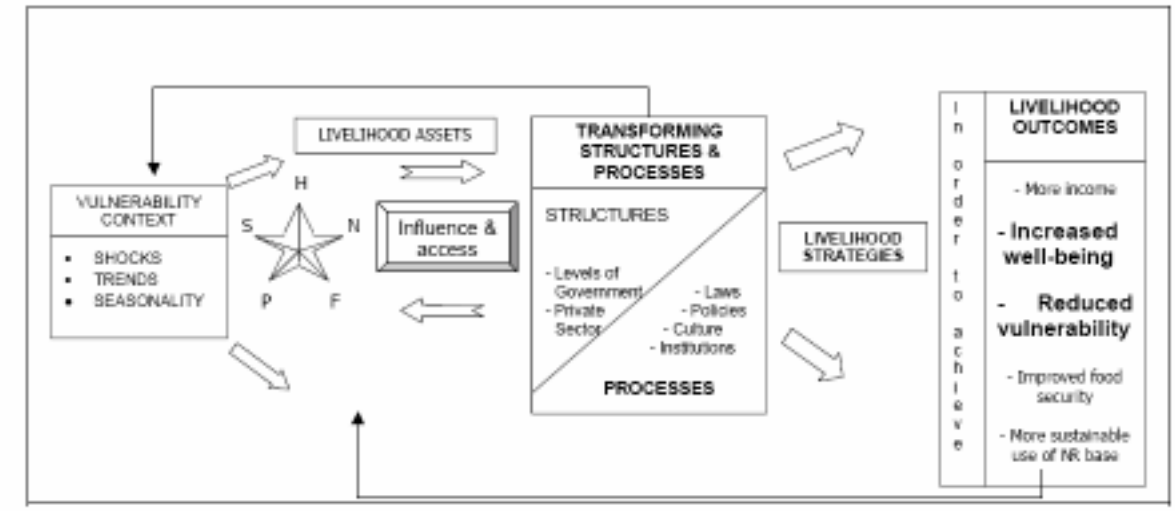
Source: Author's calculations based on Thornton et al. 2002

4. THE VULNERABILITY OF PASTORAL LIVELIHOODS

Internationally comparable poverty lines are useful for deriving continental and global estimates of poverty incidence, but do provide clear policy guidance as they do not identify and quantify the multiple dimensions of human well-being. The dimensions of poverty encompass lack of food, shelter and clothing; illness and limited or no access to health services; illiteracy and few or no educational opportunities; insecurity and vulnerability to events such as natural disasters and economic crises; exclusion from political power and, worst of all, no or little hope for future improvement.

There is no single indicator to measure all the above dimensions of poverty and data are collected separately for the different variables, such as household income, years of schooling, degree of malnutrition, etc. The sustainable livelihoods approach attempts to overcome these divisions, and provides a framework to assess the interaction of the different dimensions of poverty and to gain a better understanding of the causes and dynamics of poverty and vulnerability in a holistic context (Fig. 4). This should facilitate designing effective pro-poor policies and strategies.

Figure 4: *The Sustainable Livelihoods Approach*



Source: **Carney, D. et al (1999:9)**

Key:

H	=	Human Capital
N	=	Natural Capital
F	=	Financial Capital
S	=	Social Capital
P	=	Physical Capital

The livelihood framework views people as operating in a context of vulnerability. Within this context, they have access to the assets or poverty reducing factors. These gain their meaning and value through the prevailing social, institutional and organizational environment that influences the livelihood strategies designed to meet own livelihood objectives

The livelihood framework views the livelihoods of people as determined by five 'capitals', namely human capital (e.g. education), natural capital (e.g. land), financial capital (e.g. access to credit), social capital (e.g. community networks) and physical capital (e.g. livestock) and the institutional environment within which people operate. Within this framework, livelihoods are not static but exposed to shocks, seasonal variability and long term trends. Vulnerability denotes the lack of resilience to shocks, seasonal variability and/or long term trends.

Vulnerability is closely linked to asset ownership: the more assets people have, the less vulnerable they are and the greater the erosion of assets the greater the level of vulnerability (Moser and Holland 1997). Although access to assets is the most prominent component of the livelihoods approach, the framework takes into account

the capability to make profitable use of and combine these assets to improve existing livelihood strategies. Thereby the livelihoods framework is dynamic and not static and should guide policy makers to not only consider peoples' access to assets but also the economic and institutional setting within which they can or cannot profitably transform them.

4.1 Pastoral Assets and their Combination to Livelihood Strategies

Identifying the access to assets is the first step of a livelihoods analysis and serves to distinguish different wealth groups who face common constraints and options. Wealth groups are defined in terms of a livelihood's main asset, such as land, livestock, capital, education, skills, labour availability and/or social capital. For example, the wealth group information elaborated by FEWS (FEWSnet 2004/5) for pastoralists in different geographical regions of Africa provides information about household size, livestock herd, crops, major sources of income and, for the Southeast Djibouti border, even about number of wives of the household head. Based on this information, pastoralists are classified into three wealth groups: the poor, the 'middle' and the 'better-off' for different pastoral situations (see examples in the Annex 7). The FEWS wealth group breakdown confirms that in the different pastoral situations of Africa a large share of pastoralists, namely between 20 and 60 percent are poor, whereas better off households only represent around 10 to 30 percent of all pastoral people.

Livestock are the main livelihood resource of pastoralists performing multiple roles to satisfy economic, social and ecological needs. The main functions of livestock in pastoral households are provision of cash through sales of milk, live animals and other animal products; provision of subsistence products (milk, blood, and meat); building social alliances (bride price, stock alliances, and stock patronages) and storage of wealth. The number of livestock a household owns is usually the most significant asset determining its wealth (Catley 2000; FEWSnet 2004/5). Niamir-Fuller and Turner (1999) estimate that the minimum number of livestock units[9] below which a typical pastoral household is unable to resist drought cycles is 50 in arid and 30 in semi-arid areas.

Sandford (2006 personal communication) points out that the number of livestock needed to sustain a pastoral household also depends on the extent to which:

- Pastoralists can make use of trade to buy cheaper food in exchange for livestock and their products;
- Pastoralists have diversified their economic activities and consequently receive wages or other forms of incomes as well as remittances;

Based on the literature summarized in table 4 Sandford further notes that the minimum herd size deemed sufficient to sustain a representative pastoral household has tended to decrease over the last three decades and suggests that growing market participation and diversification as well as advances in estimation techniques are possible explanations

[9] A livestock unit being defined as 1 cow, or 6 sheep or 6 goats

Table 4: *Estimates of minimum Tropical Livestock Units (TLUs*) needed for viable herd size supporting a typical pastoral household* [10]

Reference	Pastoral group or area	Date of estimate	Minimum TLUs* required per household	Minimum TLUs* required per AAME
Jacobs, 1963, (quoted in Dahl and Hjort, 1976)	Maasai	1963	70	14.0
Dahl and Hjort, 1976	Pastoral Africa	1976	45	9.0
Little *et al*., 2001	Kenya	2001	28	5.6
Dietz *et al*., 2001	Kenya	2001	10	2.0
FAO (Dollo Ado survey), 2006	Somalia	2006	16 (small ruminants); or 21 (for cattle)	3.1 (small ruminants; or 4.0 (for cattle)

* A Tropical Livestock Unit is considered to weigh 250 Kgs; conversion factors for common livestock species are: cattle = 0.7 TLU, camels = 1.0 TLU, and small ruminants = 0.1 TLU. In his comparison Sandford assumes a herd structure in which fertile cows make up 30% of total herd.

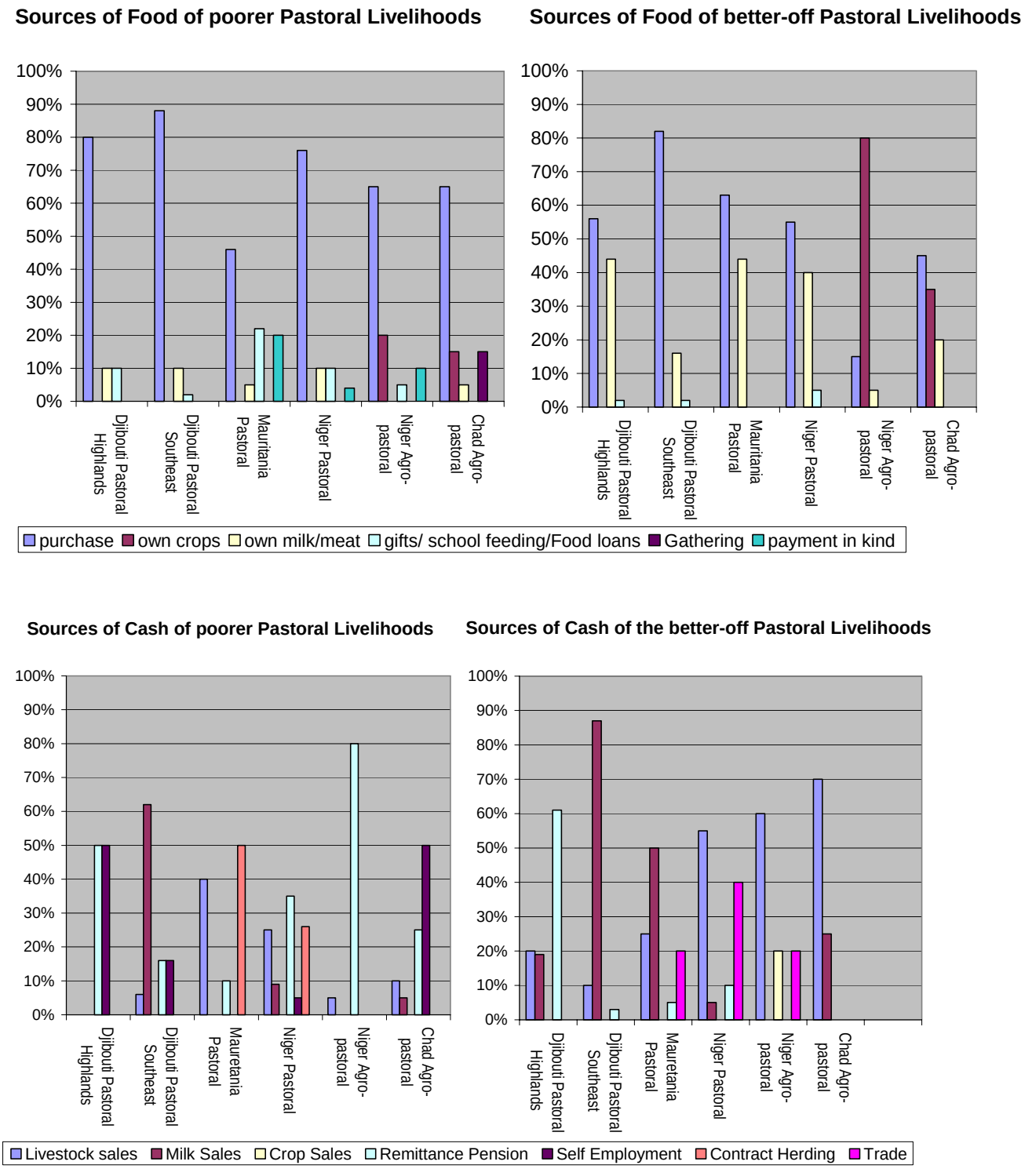
The wealth group information gathered by FEWS also shows that, while there are significant commonalities between the different pastoral situations, some assets are of different relevance depending on the region. For instance, the economic role of camels differs from region to region: camels can either serve as transport or pack animals or for milking. In the less dry areas, such as the Djibouti South East Border Zone and the Mauritania agro-pastoral Zone, ownership of 1 to 4 camels serving for transport is an important indicator of wealth, whereas in very dry areas, such as the Mauritania Nomadic Pastoral Zone, the Niger Pastoral Zone and the Djibouti Southeast Pastoral Road Side Zone, the ownership of 2 to 4 camels is considered a sign of poverty, because in these zones camels are owned to produce milk. Sheep and goats have the same role in the different pastoral situations; poor households generally own less than 20 sheep and goats, whereas better-off households own more than 100.

The second fundamental asset for pastoralists is access to pasture, which serves as feed resource for their livestock. The use of pastures is mostly determined by assigned access rights to water. However, as rangelands are generally a common good, access to pasture does not lend itself as indicator for wealth group categorization, but serves to describe the vulnerability of a specific pastoral situation. Agro-pastoralists are less dependent on pastures than nomadic pastoralists as animals are allowed to graze stubble after harvest. For agro-pastoralists the area planted is an indicator of wealth. According to FEWS (FEWSnet 2004/5), poor households plant 1 to 2 hectares whereas better off households plant 3 to 5 hectares.

Although for pastoralists access to livestock, pasture and water is fundamental, their ability to combine them into a sustainable livelihood and to convert them into cash or food is equally relevant. Pastoralists are in fact highly dependent on cash income to satisfy their nutritional needs, and typically trade their livestock and derived products for staples with lower costs per calorie. As shown in Figure 5 the pastoralists in Djibouti, Mauritania, Niger and Chad depend to 70% on the purchase of crops, and among the agro-pastoralist the poorer households face the same dependency.

[10] To make comparisons between estimates a pastoral family of 7 people equivalent in age and sex distribution to 5 adult males (AAME - African Adult Male Equivalent) is assumed.

Figure 5: *Sources of cash and sources of food of different pastoral livelihoods*



Source: FEWSnet 2004/5

Pastoralists can seldom afford to eat meat, and usually choose the species slaughtered to conform to a specific occasion. The main subsistence product obtained from livestock is milk[11]. In their study on commercialization and dairy production of pastoralists in Africa, Sikana *et al*. (1993) explore the factors influencing herders' decisions to consume or sell milk versus using milk to enhance the growth of calves for the market. They conclude that the determining factors which are traded off against each other are the use value of milk (defined by the volume of milk output, number of consumers and available female labour for dairying), the exchange value of milk (defined by prices, demand and market access) and the value of milk as an input to intensify meat production (this in turn is defined by the trade off between use value and the exchange value of live animals).

The comparison of the livelihood strategies of the poor and better off pastoral groups in Figure 5 shows that only the better off households consume larger quantities of milk while poorer pastoral households prefer to sell milk rather than to consume it. This can be explained by the fact that terms of trade are favorable for pastoral producers as weight for weight the energy content (calories) of cereals is greater than that of animal products.

Milk sale is especially high in the Djibouti Southeast Roadside zone, where market access is good. Poor pastoralists tend to move closer to urban centers for better access to the milk market. However, this reduces herd mobility which not only negatively affects animal growth and milk offtake (Table 5), but also increases vulnerability to drought. A widely practiced strategy is the splitting of the herd: the women together with the lactating stock move closer to the centre while the men stay with the rest of the herd in the remote rural areas.

Table 5: *Milk output from mobile and sedentary herds, Southern Sudan.*

Location of herd	Average yield per cow per day	
	Dry season	Wet season
Camp (mobile)	0.73	1.50
Homestead (sedentary)	0.34	0.83

Source: Niamir 1982

The availability of household labour for herding is another important livelihood resource. Tending large herds with different species requires a certain number of healthy family members of both genders, and better-off households tend to be larger than poorer households. Firstly, the household head tends to be older, thus having had more time to accumulate livestock, wives and, therefore, children. Better-off households can thus support more members, and often include 1 to 2 relatives from poorer households. Secondly, poor households are often forced to send family members to urban centers to earn additional income. The sources of income depicted in Figure 5 show that poorer households depend more on remittances and pensions from family members, who have migrated to towns than do the better-off households. Additionally, poorer households have to resort to putting labour of family members at the disposal of rich herders, who engage them through contract herding schemes. Better-off herders on the other hand rely less on remittances, pensions and self-employment activities, and tend to engage in trading activities.

[11] Apart from milk, live animals can also yield blood and this has been historically exploited in the Horn of Africa, although it is a practice looked on with distaste by pastoralists elsewhere.

4.2 Pastoral Vulnerability

So far this paper has differentiated livestock keepers by production system, their livelihood assets, and their capacity to participate in the economic growth process. However, pastoral livelihoods should be considered in the dynamic context where pastoralists operate, including natural and market shocks, and seasonal and long-term trends that can make pastoralists vulnerable to poverty. Vulnerability is therefore determined by the (in)capacity to cope with seasonal variations, shocks/risks and trends/irreversible changes.

Dercon (2001) makes uses of a survey-based quantitative approach to measure risk and vulnerability and, even though he is not making use of the livelihoods approach, his definitions of risk and vulnerability fit well into the livelihoods approach. He defines risks as uncertain events that can damage well being. The uncertainty pertains to the occurrence, timing and magnitude of the negative event. Vulnerability denotes the lack of resilience to the occurrence of these uncertain events (risks), including long-term and seasonal trends. Vulnerability, therefore, is not only an important dimension of poverty and deprivation, but also a potential cause.

The World Bank Development Report 2000/2001 classifies risks by the level at which they occur: (1) micro-shocks, often referred to as idiosyncratic, affecting specific individuals or households; (2) meso-shocks that affect specific groups of households within a region, and (3) macro-shocks that affect all households in a region. The latter two are referred to as covariant. These shocks can have different sources such as natural, social, economic, environmental and political disasters, most of which have their likely origin in human activities (see table 6).

Pastoralists face the natural covariant risk of drought; the idiosyncratic risk of human illness and the idiosyncratic risk of livestock diseases, which can turn into a covariant risk in case of an epidemic; the covariant economic risk of exclusion from markets; and the social idiosyncratic risk of violent conflict over increasingly scarce resources, which can turn into the covariant risk of civil strife. This latter risk is amplified by the covariant political risk of marginalization and the covariant environmental risk of pasture degradation.

For policy making it is important to distinguish between idiosyncratic risks, which threaten individuals, and covariant risks which threaten groups or entire communities. The management of covariant risks often calls for public sector engagement and investment, while idiosyncratic risks are normally best dealt with by the household itself.

Table 6: *Categorization of risks.*

Type of risk	Idiosyncratic Risks affecting an individual or household (micro)	Covariant Risks affecting groups of households or communities (meso)	Covariant Risks affecting regions or nation (macro)
Natural		Rainfall	Flood Drought
Health	Illness Injury Disability Old age, Death	Pandemic	
Social	Crime Domestic violence	Tribal war Inter-clan conflicts	Civil strife War Social upheaval

Economic		Unemployment Resettlement Livestock disease	Terms of trade shock Market exclusion Epidemic
Political		Riots	Political default on social programs Coup d'état
Environmental		Pollution Deforestation Degradation	Desertification

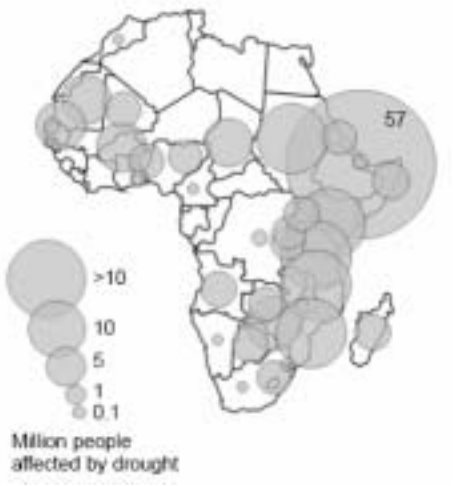
Source: Adapted from World Development Report 2000/01, p.136

4.2.1 The Risk of Drought

Droughts, or periods of unusually low rainfall, are part of the expected pattern of precipitation in semi-arid Africa. Following the definition of Pratt *et al*. (1997) a drought occurs when rainfall in a year is below half the long-term average or when rainfall in two or more successive years falls 25% percent below the long term average. Nine major droughts have occurred on the African continent in the last four decades: 1965/66, 1972/74, 1981/84, 1986/87, 1991/92, 1994/95, 1999/2001 and 2005/6. The drought of 1981/84 was the worst ever recorded for the Greater Horn of Africa. Millions of people were affected by these droughts and suffered from famine (see fig. 6).

Pastoralists are particularly vulnerable to droughts. The lack of rainfall reduces water and forage availability on the rangelands, which creates an imbalance between the number of livestock and available fodder. Animals become emaciated and die or have to be sold preemptively. Although herders are equally exposed to the risk of drought as droughts are a regional and even interregional meteorological phenomenon, the effects of a drought are not identical across households, but are conditioned by the initial household wealth status.

Figure 6: *Drought and Famine in Africa 1971-2000*



Source: UNDP Grid Arandal

Poorer pastoralist households, owning small herds, are more vulnerable to drought than wealthier households with larger herds. While a loss of half of the herd would certainly represent a serious loss to a family owning a herd of 200, the same proportional loss would have devastating effects for a family making a living off a herd of 20 animals, potentially locking the latter household in a low income equilibrium, from which it will be difficult to escape after the drought. In addition to the fact that the possession of a larger pre-drought herd ensures a reasonable post-drought herd size, Hogg (1997) points out that wealthier herders get through a drought better than poorer ones because they may also enjoy more political influence and thus preferential access to grazing, water, credit, and veterinary services. Also wealthier pastoralist households are better equipped to diversify during drought, for example by engaging in petty trade and by migration, which also enhances their capacity to recover post-drought.

The detrimental effect of drought on pastoralists is exacerbated by the natural reaction of livestock markets (Smith *et al*. 1999). Analyses of price movements show that the livestock/grain terms of trade rapidly turn against livestock during drought (Williams 2002a; FEWSnet 2004/5; Holtzmann and Kulibaba 1994; Toulmin 1994; Fafchamps *et al*. 1998). The price movements are due to two independent processes that aggravate each other: as the production of staples decreases in a period of drought, their price rises dramatically and pastoralists are thus forced to sell more animals than in normal years to satisfy their need for cereals.[12] This process in turn causes the price of livestock to decrease. Additionally, during severe droughts livestock mortality increases dramatically and herders tend to sell their animals preemptively before they become emaciated. In such situations the price of livestock collapses (see fig. 7). For example the 2005 famine in Niger was preceded by a rise in prices for millet and sorghum by 75 to 80 percent above the average of the last five years, while the prices for livestock decreased by more than 50 percent.

Figure 7: *Terms of trade for rice, local or export goat, and labour, Somalia 1998-2004.*

Source: FSAU 2005

[12] As the production of milk goes down, the price of milk rises, so that the value of milk produced might not be much lower than before. However, the increase in the price of milk does not normally equate to the rise of the price of cereals.

In contrast to poorer livestock keepers, wealthier herders and urban entrepreneurs are able take advantage of the market situation during drought: they buy livestock at low prices as an investment as they are able to keep the stock alive through purchase of feed. Post drought they often entrust the animals to impoverished pastoralists to manage them. As a consequence, many herders are gradually transformed from herder-owners to hired herders. This shift was observed during the droughts of the 1970s and 1980s by Gass and Sumberg (1993) and White (1991). Estimates of the proportion of livestock now belonging to absentee herd owners are as high as 80 percent in some areas, e.g. Mopti, Mali (Shanmugaratnam *et al*. 1992).

4.2.2 The Risk of Epidemic and Zoonotic Diseases

Pastoralists face the idiosyncratic risk of animal diseases, which, depending on the disease, can turn into the risk of an epidemic, that can rapidly eliminate an entire herd and spread over wide areas. The rinderpest epidemics, which swept through Africa in the 1980's, devastated pastoral herds throughout the continent and brought entire herding systems to an end. Rinderpest is now almost eradicated; however the threat of its resurgence exists as the rinderpest virus is still maintained in the 'Somali Ecosystem'. Other important diseases in Africa that can cause epidemics are Foot and Mouth Disease, Peste des Petits Ruminants, and Contagious Bovine Pleuropneumonia.

Zoonotic diseases such as Anthrax, Brucellosis, Q fever, Rabies, Rift Valley Fever or Tuberculosis expose pastoralists themselves to illness. The health status of pastoralists is further threatened by the HIV/AIDS epidemic, although HIV/AIDS is currently concentrated in the cities and along the major trade roads and not widespread in pastoral areas. The risk that HIV will soon also affect pastoralists, however, should not be underestimated, given the growing market integration of pastoral people. Coast (2002) and May (2003) warn that in East Africa pastoral migrants to towns remain excluded from public information on HIV/AIDS, which increases their risk of becoming infected and introducing the virus into their pastoral communities.

As in the case of drought, poorer pastoralists are more vulnerable to the risk of animal diseases and human illness, because they lack relevant knowledge to avoid risky practices and have insufficient resources to purchase drugs for treatment. As a result, the loss of livestock and death of family members are more common among the poorer than among the wealthier herders.

The vulnerability to the risk of disease depends very much on the access to veterinary services for preventive vaccinations and for treatment in case of illness. The same holds true for the vulnerability to the risk of human disease. During the great African Depression in the 80's, governments were no longer able to provide health services free of charge. Structural adjustment and liberalization programs, which included the privatization of the provision of certain veterinary services, left the remote pastoral areas, which had traditionally already been poorly served by state institutions, without access to services, as pastoralists, being poor, poorly educated and dispersed were not able to effectively demand the services of private veterinarians. Odeyemi (1999) showed that in marginal pastoral areas the provision of animal health care by professional veterinarians is not viable as their income expectation plus the drug costs and the cost to the farmer of reaching the veterinarian are larger than the value of the animal requiring treatment.

4.2.3 The Risk of Market Exclusion

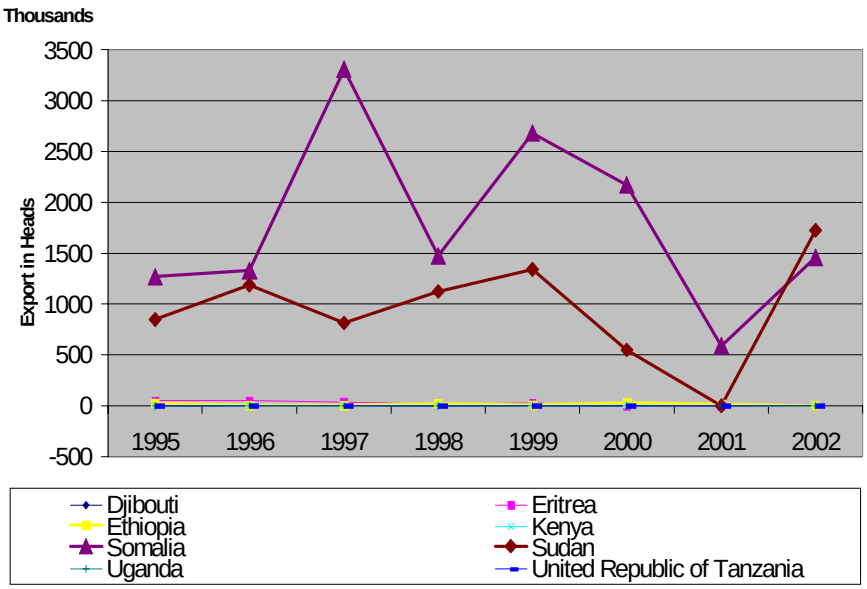
Pastoralists are exposed to the risk of being excluded from domestic and international markets because of high transaction costs, making it more convenient to supply urban consumers with imported livestock products, and / or because they are not able to

satisfy some minimum food safety requirement. For instance, poor dairy hygiene in pastoral production systems[13] make contract schemes between pastoralists and processors particularly difficult (Mbogoh 1984), an example being the failed attempt of Nestlé to integrate pastoralists into their procurement system in Senegal (Cheikh *et al*. no date). In general, in East Africa the exclusion from international markets, particularly those of the Near East, due to insufficient compliance with health standards is of major concern, while in West Africa the major challenge is to substitute livestock product imports to the coastal markets with local and regional produce.

The Gulf countries are important trade partners for East African countries, and especially for Sudan and Somalia. However, these trade relationships have been shaded by recurrent 'stop and go' due to animal diseases, such as Rift Valley Fever. In 1997 and 2001, for example, the Gulf countries made use of an import ban to control health risks. Livestock exports were reduced by more than 70 percent, drastically cutting the associated revenues (see fig. 8).

The emergence of new suppliers to the Gulf States such as Australia, New Zealand and some European countries now puts the East African countries under competitive pressure. Poor export performance in Ethiopia and Kenya has led to the deterioration of holding grounds, stock routes, watering points, quarantine stations and market yards. Also, high marketing costs due to high transport and transaction costs increases the terminal market price up to twice and in extreme cases four times over the producer price (Aklilu *et al*. 2002).

Figure 8: *Live Sheep Exports from the Greater Horn of Africa to the Gulf Countries*



Source: FAOSTAT 2005

In West Africa inter-regional trade of agricultural commodities, in value terms, is dominated by livestock. This trade has historically consisted of the Sahelian countries (e.g. Burkina Faso, Mali and Niger) exporting livestock to the humid coastal countries (e.g. Côte d'Ivoire, Ghana, Nigeria). In spite of the expected restoration of the

[13] As pastoralists boil their milk, health risks (e.g. brucellosis) are reduced.

competitiveness of the beef sub sector of Sahelian exports following the 1994 devaluation of the FCFA, Sahelian countries are often excluded from the lucrative and expanding coastal markets due to prohibitively high marketing costs (CILSS 1998; Hoffmann 1998). A study by ILRI on West African Livestock markets revealed that the purchase of cattle at an average price of 105,850 FCFA[14] in the exporting countries represents 83 percent of all costs incurred in cross-border cattle marketing (Williams 2002b). Williams (2002b) calculates that cross-border livestock marketing costs subdivide into 6 percent illegal road taxation, 8 percent incidental costs at purchase, 10 percent opportunity cost of capital, 28 percent official costs, duties and taxes, and 48 percent transportation and handling costs. The transportation and handling costs can further be split as follows: 6 percent for trader travel, 8 percent market association fees, 18 percent driver wages and animal care, 19 percent convoyage fees and 69 percent truck rental.

Boutonnet *et al*. (2000) calculate that livestock production in Burkina Faso, Mali, Niger is globally competitive at a production cost of US$ 1,500/t compared to US$ 1,900 and US$ 3,199/t for the United States and the European Union respectively. However, Yade *et al*. (1998) showed that it costs about US$ 230/t of beef equivalent to move cattle from the Sahel to the coast of West Africa compared with only US$ 80/t of beef shipped in from Europe.

In addition to the risk of being excluded from export markets pastoralists often have poor access to local markets as well, and find themselves in a disadvantaged negotiating position. As most rural areas have poor roads and inadequate transportation facilities, the direct participation of pastoralists in markets is limited, leaving pastoralists three options to market their animals: (1) via itinerant traders, (2) at collection markets and (3) directly at a frontier market. Due to high transport costs in relation to the number of livestock sold, pastoralists, particularly the poorest ones, are excluded from actively participating in the market and forced to sell their livestock to itinerant traders. Market prices obtained for their animals are also low, because pastoralists with urgent cash needs are often unable to reject low price offers: once having made a long journey to a livestock market, the cost of returning with the animals and making another journey are disincentives to hard bargaining.

4.2.3.1 The Risk of Violent Conflict and Political Unrest

Pastoralists are vulnerable to the risk of violent conflict which can turn into the covariant risk of civil strife and war. Conflict situations might lead to displacement, suffering and death of many, and particularly of the most vulnerable, but also the risk of conflict itself carries a number of indirect and long term effects on pastoral livelihoods as it often reverses ongoing development processes.

Violent conflict between farmers, pastoralists and conservationists increasingly arises because growing human and livestock populations result in increasing competition over the natural resource base and degradation of the environment. At the same time the capacity of traditional institutions to efficiently manage and regulate the increasing competition is being eroded (Homer-Dixon 1995; Harshberger 1995; Vedeld 1994; Vedeld 1998; Scoones 1994 b; Cousins 1996; Winrock International 1992; Lane and Moorehead 1995). Furthermore, the risk of conflict between farmers, conservationists and pastoralists is amplified by the structural marginalization of pastoralists discussed above.

4.2.3.2 Violent Conflict over Natural Resources

Conflicts over natural resources involve three interest groups: herders, farmers and conservationists (see table 7). One can distinguish conducive factors, also referred to

[14] At the time when the study was made US$ 1= 550FCFA.

as root causes, and proximate factors of conflicts. Conducive factors are the underlying socio-economic and historical conditions, such as human and population growth, that predispose communities to conflict although by themselves they do not lead to violence. Proximate factors are the intermediating sources of conflict, which include peoples' behaviour and institutional, political processes and organizations that aggregate people with different and opposing interests thus leading to conflicts (Haldermann *et al*. 2002).

Increasing conflicts about natural resource use between crop farmers and herders are fuelled by two trends. On the one hand, population growth is driving the expansion of settled-agriculture towards arid the semi-arid areas.[15] On the other hand, rainfall deficits and droughts recurrently induce herd movements into the sub-humid areas where cropping is prevalent. Both movements are leading to increasing competition for natural resources and conflict between herders and farmers (table 7).

The increasing competition of growing populations over de facto fixed natural resources is a serious issue, especially regarding the thread of increasing environmental degradation. Globally, approximately 20 percent of the drylands are degraded, with 17 percent being lightly to moderately degraded and 3 percent being strongly to extremely degraded. Regionally, the African drylands are the most degraded with approximately 319 million hectares (25%) of degraded soils (White and Nackoney 2003).

Conflict between farmers and pastoralists arises above all over key resource sites, areas which are particularly important for livestock production and at the same time offer possibilities for crop farming (Scoones 1994). It has been shown that in the dry season or in dry years, livestock depend on relatively small patches of land within the wider dryland landscape, which constitute key resources that sustain animals in times of fodder shortage. The exclusion of pastoralists from these key pastoral resources can lead to significant disruption of the annual transhumance cycle (Niamir-Fuller and Turner 1999), which is particularly the case when farmers restrict access to wetlands, river valleys and other water resources they wish to reserve for the intensification of crop production (Southgate and Hulme, 2000; Woodhouse *et al*, 2000).

The reasons for livestock entering cropped fields are therefore manifold and range from the need for feed, involuntary accidents, and the need to trespass fields that once were old transhumance routes giving access to water points and/or markets. In Burkina Faso, for instance, the droughts in the 1970's and 1980's have forced Fulani pastoralists to migrate from the North to South West; at the same time the population in Southwest Burkina Faso has dramatically increased due to immigration from Ivory Coast. Between 2000 and 2003, 111 conflicts have been reported in this region, of which 87% were farmer-herder conflicts about crop damage caused by livestock (Brockhaus *et al*. 2003).

Conflict between herders and conservationists occurs because growing human populations and increasing agricultural production have also led to increased pressure on wildlife and endangered biodiversity. With increasing concern for the conservation of biological diversity, the number and size of protected areas are increasing. In 2003, 8.7% of Western and Central Africa and 14.6% of Eastern and Southern Africa were protected (IUCN and UNEP 2003). As rangelands are often remote and have a low population density, they serve as natural habitat or areas of retreat for wildlife and provide a distinct flora and fauna. Therefore rangeland areas have often been

[15] Pastoralists find it difficult to make a living in semi-arid areas not only because of limited technical possibilities of improving the productivity of rangelands and livestock but, in some circumstances, also because of increasing pastoral populations. Bollig and Lang (1999), for instance, examined the demographic trends in two pastoral populations, the Pokot of Kenya and the Himba of Namibia, over the last century The Himba population grew at an annual rate of 0.08% compared to 2.4% for the Pokot. Among the Himna, the people to livestock ratio was 1:5 at the beginning of last century and went up to 1:10 in the 1950s. Conversely, for the Pokot, the ratio of people to livestock was above 1:10 during the first part of the 1900 and declined to a low of 1:2 and even 1:1 in the second half of last century.

chosen for protection (Toutain 2002), which has been source of several documented conflicts (see table 4). However, while in the past the general view was that wildlife conservation and livestock keeping are incompatible forms of land use and should be kept apart, there is now broad consensus that pastoralists may contribute to the protection of wildlife (Boyd *et al*. 1999).

Violent conflict between herders over access to water and pasture is also increasing. Conflicting interests over natural resources in pastoral areas have always existed, but they were contained by customary institutions that were functioning following the principle of reciprocity. Both, increasing pressure of resources and the decreasing efficiency of traditional conflict-management mechanisms, which are correlated, are making these conflicts harsher (Thébaud and Batterbury 2001).

Cattle raids have been a traditional practice among many pastoral communities, for restocking depleted herds, establishing age set reputation and accumulating bride wealth, or in revenge for a previous raid. With the commercialization of cattle and the proliferation of modern weapons a new form of unregulated and more violent form of commercial raiding has evolved. Commercialization of cattle, in fact, also enables non-herders to profit from livestock raiding as raiding can be pursued independently from the actual availability of land or labour for livestock management. The animals stolen in large-scale commercial raids are marketed very rapidly. For example, raided cattle may be moved from northern Kenya to Mombasa in five days, passing road-blocks and avoiding quarantine regulations (Waithaka 2001). As the raided herds need to be restocked, professional commercial raids may cause a chain reaction of traditional clan raids and violence (Krätli and Swift 2001).

Table 7: *Conducive and Proximate Causes for Conflicts between Herders, Farmers and Conservationists.*

	Cause		Example
	Conducive cause	**Proximate Cause**	
Herder - Farmer	Higher land values determined by agricultural intensification	Customary land use rights of pastoralists are disregarded	*Niger*: 11 people were killed in a conflict between Peul herders and settled farmers about pasture land occupied by farmers. Passè (Gaya) (AREN 2005):
		Encroachment of farmers on key sites of pasture (e.g. Chad, Burkina Faso, Mali, Niger conversion of 40 million ha of forests, wetlands, rangelands to farm land (Cleaver & Schreiber 1994)	*Niger Delta:* Development of wetland river valleys leads to conflict over land. Vedeld 1994; Gefu and Kolawole 1995)
	Changes in crop production systems; Reduced trypanosomiasis risk, southerly movement of pastoral people from the semi-arid to sub-humid zones	Homogenization of production systems with farmers having livestock and pastoralists practicing cropping weakens interdependency between farmers and pastoralists	*Tanzania*: Conflict over crop residues used for conservation farming instead of grazing. Mueller and Pezo, 2000
	Rainfall deficits induce herd movements; farmers encroach pastoral land; trekking routes to markets on privatized land	Pastoralist herds trespassing on farmers fields cause crop damage	Niger: Violent conflicts around key transhumant routes PASEL 2005
Herder - Conservationist	Extensive habitat conversion and unauthorized hunting, exacerbated by a proliferation of high-powered automatic weaponry in recent years, has hastened the long-term decline and disappearance of wildlife from many areas	International concern for the conservation of biological diversity has increased; Establishment of protected areas on land formerly used as pastures without integration of pastoralists into management of key-sites	*Tanzania, Mkomazi Game Reserve*: Conflict because access to water and grazing resources have been restricted and fuel wood gathering from the reserve is punished. Homewood *et al*. 1997 *Niger, Gadabeji Reserve*: Conflicts between government and herders grazing animals on Reserve lands, and between herding communities concentrated around the only remaining watering holes and private wells Sidikou 1995
Herder - Herder	Drought and rainfall deficits inducing herd movement	Changing modes of access to water and pasture, boosted with introduction of modern watering points	*Niger, Diffa region*: Tubu wrest armed control over modern boreholes after WoDaaBe and FulBe were forced to move southwards in response to rainfall deficits in 1984 Thebaud and Batterbury 2001
	Need for restocking after drought, age set reputation, revenge for previous raid	Traditional cattle raiding	*Karamojong region in Uganda, Kenya, Sudan, and Ethiopia*: Increasing armed raids since the 1970's Halderman *et al*., 2002
	Market integration, proliferation of modern weapons	Commercial cattle raiding	

DECREASING NATURAL RESOURCES / INCREASING POPULATION

4.2.3.3 Conflict caused by Marginalization of Pastoralists

Pastoral communities remain among the most politically and economically marginalized groups in many societies leading to policies biased in favour of settled farmers, which is perceived as discrimination by many pastoralists. This makes pastoralists prone to radicalisation and recruitment by insurgent groups from conflict entrepreneurs. In the past 20 years alone numerous political resistance movements in Africa (e.g. Algeria, Ethiopia, Kenya, Mali, Somali, Sudan, Uganda) have emerged in pastoral areas that have been economically and politically discriminated against, as well as forcefully subjugated to foreign political structures and at times compulsory settlement (Little, 2003).

The marginalization of nomadic pastoralists can fuel conflict, especially in cases where the power imbalance between pastoralists and a farmer-biased state is complemented with a knowledge gap of the policy makers about the pastoral system, leading to regional and local management, which is also biased against pastoralists, even if where they constitute the local majority.

As rangelands are often situated in the periphery of nation states and because nomadic or transhumant pastoralists have little regard for national frontiers, which potentially creates international conflict[16], national policies tend to favour the settlement of pastoral communities closer to the population centres. In this case the marginalization of pastoralists is so deeply rooted in the nation building process that it has to be regarded as a structural problem[17].

[16] This is often the case when herders arrive in northern Ivory Coast or Ghana from Burkina Faso or Mali; along transhumant routes between western Mali, Mauritania and Senegal; or between Niger, Nigeria and Benin. This may provoke conflicts and international confrontation as in the case of the Mauritanian military action in 1992. Two Senegalese cultivators were killed following a confrontation between Mauritanian Peul herders and Sominké cultivators, a killing which turned into a serious international incident leading to the death of hundreds (Parker et al. 1991).

[17] The problem of structural marginalization of pastoral people becomes evident in the conflict between the Tuareg and the southern population of Mali and Niger. The abandonment of the idea of creating a French Sahara and the creation of the newly independent states of Mali and Niger raised the difficult problem of the integration of the nomadic populations (Bourgeot 1995). The state elites all originated from southern populations, and the decolonization process transformed the northern (nomadic) zones into culturally, politically and economically isolates areas. This marginalization constitutes the contextual framework for the emergence of modern Tuareg resistance (Lehtinen 2004).

5. RISK MANAGEMENT POLICIES / STRATEGIES

The terms policy and strategy do not have universally agreed definitions and are often loosely used. In this paper, policy is defined as the general principle(s) taken by a policy-maker to achieve a longer-term policy objective. A strategy is a plan to achieve the policy objective, determined by the selected principle(s) and making use of available policy instruments, such as laws, taxes, subsidies etc.

In contrast to policies and strategies defined and implemented by governments, livelihood strategies are the result of decisions made at the micro-level by the pastoral household, i.e. they are the ways whereby people combine and use their assets to achieve their own personal and collective goals. Pastoral livelihood strategies are significantly affected by risks and seasonal/long term trends. First, some of pastoral assets are *per se* subject to risks: for instance, a drought or an epidemic may significantly reduce herd size; ethnic conflicts may reduce social capital within the community. Second, the transformation of assets into welfare/income benefits is subject to risks: for example, encroachment of land by settled farmers may deprive pastoral people of access to water points; declining terms of trade for livestock might make their sale unprofitable. Policies aiming at pastoral development, therefore, need to incorporate risk management strategies to reduce the exposure and vulnerability of pastoral people to the different risks. On the one hand, policy makers should aim to strengthen the resilience of pastoral people through supporting diverse risk management strategies, while on the other hand they should address the growing imbalance between humans, livestock and the environment through facilitating the engagement of pastoral people in alternative income generating activities.

For risk management policy making it is important to distinguish between idiosyncratic risks, which threaten individuals, and covariant risks which threaten groups or entire communities. The management of covariant risks often calls for public sector engagement and investment, while idiosyncratic risks are normally best dealt with by the household itself. Policy makers should therefore concentrate on the development and implementation of policies / strategies to manage covariant risks, which call for public sector engagement. However, they should also implement measures to support households adopt risk-coping mechanisms building on traditional pastoral livelihood strategies.

Risk management strategies can be sub-divided into risk reduction, risk mitigation and risk coping strategies. Risk reduction strategies aim to reduce the probability that the risk occurs and develops into a disaster situation; risk mitigation aims at reducing the impact of a hazard, while risk coping strategies aim to provide relief assistance. In principle the preferred approach should be first to reduce the likelihood of risks, then to mitigate the negative impacts of a shock (i.e. a materialized risk), so that the need for coping strategies is minimized. This is not always possible however. While the outbreak of epidemics, violent conflicts and riots, or the degradation of pastures can in theory be prevented, in the case of drought only risk mitigation and risk coping strategies can be set in place.

5.1 Pastoral Risk Management Strategies

The more idiosyncratic the risk pastoralists face, the greater the potential role for local responses drawing on community and/or household resources (Lybbert *et al*., 2001). A large variety of traditional risk-minimizing strategies based on endogenous social safety nets exists and has been detailed in the ethnographic literature (Niamir-Fuller and Turner 1999; Breamaud and Pagot 1962; Dahl and Hjort 1976; Sandford 1983; Comarfoff 1990; Bohanan 1967; Douglas 1967).

5.1.1 Mobility and Opportunistic Tracking

The most prominent livelihood strategy of pastoralists is the movement of their herds in reaction to anticipated seasonal and annual changes in pasture availability. Herd movement takes place both on daily/diurnal grazing cycles to and from a central point where suckling calves are allowed to rejoin their mothers at milking, and on larger scale where both herds and herder move from one central point to another. Pastoral livelihoods, in fact, mainly differ by the degree of movement from highly nomadic, through transhumant to sedentary.

Nomadic pastoralists prefer to retain established migration routes, which they have developed balancing their knowledge of pasture, rainfall, disease, political insecurity and national boundaries with access to markets and infrastructure. However, the variation in rainfall quantity and its seasonal distribution, especially in the very arid areas, require certain flexibility and enforce irregularities in the movement. Conversely, in semi arid areas and in areas with less variation in rainfall, pastoralists pursue transhumant herd movement based on regular movements of herds between fixed areas. Transhumant pastoralists often have a permanent homestead, where the older members and the younger children remain throughout the whole year.

Customary pastoral tenure systems are therefore composed of different levels of territorial units with different management units. In particular, in arid and semi-arid areas, variation in soil type and topography can result in very patchy pasture production, containing keysites for pastoral production such as dry season reserves, drought reserves, swamps, water points, lakes, salt licks and micro patches for fodder production or cereal cultivation (Swallow 1994). In customary pastoral tenure system these key sites are the center of territorial units. For example, in the dry season herds need to stay within a radius of 15 to 25 km around the wells to be regularly watered. Therefore access to pastures is determined by rules of access to wells (Thébaud and Batterbury 2001).

Traditionally, pastoralists ensure access to grazing lands in dry areas by digging their own wells and watering points, which allows local negotiation on access to water and pastures (Taylor 1996). The introduction of modern hydraulic systems (boreholes particularly since the 1950s and cement lined wells since the 1970s) has modified property regimes and increased the number of animals that can be supported by one water point. Since the same resource may be used by different groups of users, pastoralists have developed regulations governing access to the resource, whereby those having priority rights of use are also responsible for the sound management of the resource (Niamir 1991).

In case of drought or increasing degradation of rangelands, these opportunistic tracking strategies are intensified. During the 1995-97 drought and the 1997-98 El Niño rains, in Ethiopia, Kenya, Tanzania and Uganda distance trekked to water sources almost tripled, from an average (across zones) of 5.9 km pre-drought to 15.8 km during drought; pure-pastoralists trekked greater distances than agro-pastoralists. Distances to grazing sites also increased, from an average (across zones) of 5.5 km pre-drought to 20.4 km during drought (Ndikumana *et al*. 2002).

5.1.2 Herd Management

It has been argued that pastoralists, being constantly exposed to the risk of loosing livestock, follow an opportunistic stocking strategy, accumulating livestock numbers that exceed the subsistence demands during good years so as to still have enough reproductive females for re-establishing the herd after the crisis is over[18]. Because

[18] The expansion of herd size as a risk minimizing strategy has been largely debated in the literature. This strategy was considered as one of the causes of land degradation; but with the recognition of non-equilibrium environments, this strategy

pastoralists do not maximize a profit function, researchers have long believed that livestock are used by pastoralists as their principal store of wealth rather than as income-generating capital (Goldschmidt 1975; Doran, Low, and Kemp 1979). The store of wealth concept has been advanced to the 'target income' concept (Dahl and Hjort 1976), which argues that in anticipation of livestock losses due to recurrent risks, such as epidemics or droughts, pastoralists follow a risk minimizing strategy and sell the minimum number of animals necessary to get the 'target income' for some identified needs.

Another explanation for this behaviour is offered by the capital assets model that sets out to explain that income from livestock assets in pastoral Africa is in the form of products produced from the livestock themselves rather than in cash obtained from the sale of livestock. Livestock owners regard their animals as capital assets which produce a stream of valuable products while held and have a capital value when sold or slaughtered. Stockowners determine the optimal age of sale or slaughter by comparing the expected net present value of the future stream of products with the expected net capital value of the animal if slaughtered or sold. Calculations of the net present value of live animals is least complicated for production systems where meat is the only product and more complicated where there is a complex of valuable flow and stock products.

Pastoralists, therefore, strategically diversify the species and breeds within species in their herd taking into account that species and breeds are affected differently by most animal diseases and adapted to different environments. These breeds act as a genetic reservoir for traits and fitness characteristics that have disappeared from breeds selected on the basis of productive performance[19]. Hall and Ruane (1993) have shown that semi-arid or arid countries such as Mongolia, Yemen, Oman, those of the Sahel, and Botswana and Namibia have the largest proportional diversity of breeds[20].

Pastoralists not only diversify their herds, but also disperse animals in herds of allied households, as different herds might be affected differently by disease and drought. Livestock, therefore, play also the role of a buffer, and have therefore multifunctional roles in the household. The creation of such stock alliances and stock patronage not only create social bonds and diversify the risk of animal loss during drought, but also decrease the work load of a household. Tending large herds requires significant amounts of labor and therefore richer households either give animal loans to poorer families or employ poorer herders. Employment on the basis of contract herding is becoming more common and the pastoral sector is increasingly becoming a business of a absentee herd owners (Toulmin 1994).

With increasing integration of pastoral people into the monetarised economy and reduced reliance on informal exchange mechanisms, livestock are losing their multiplicity of roles. The traditional strategies of herd diversification, stock alliances and stock patronages are partly substituted by new monetary practice. For example, the Tshidi Barolong have accepted the donation of 'cattle without legs', an amount of money equivalent to a cattle, as a bride price or bride wealth (Comarfoff 1990; Schulz, 1996). On the one hand these innovative institutional arrangements might enable poorer herders, who receive monetary payments for their herding activities, to get married; on the other hand, however, the bride looses its insurance and the ability of the household to build up a viable herd size is reduced.

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has been recognized as a reasonable response to the high variability in forage availability and labeled as opportunistic tracking (Sandford 1983; Scoones 1994 b).

[19] Breeds differ considerably in their metabolism: the higher the genetic potential to grow or produce milk, the higher the basic metabolism. Animals with lower genetic production potential fare better with feed of poor quality or low quantity (Bayer and Waters-Bayer 1994).

[20] Hall and Ruane (1993) correlated the number of breeds of a country or area with the human population density in order to measure proportional diversity. These calculations show that remote areas have a high degree of diversity.

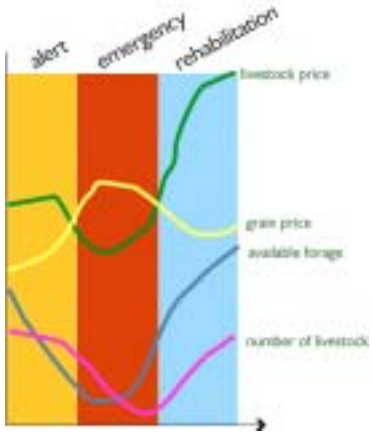
5.2 Public Risk Management Policies and Strategies

Traditional, endogenous, risk-management mechanisms developed by pastoral people are becoming increasingly ineffective due to growing pressures on scarce resources and the penetration of the monetary economy into pastoral areas. There is therefore an urgent need of policy actions, which should be different from those pursued over the last decades that tended to neglect the risk minimization rationale underpinning pastoral organizations and institutions. Policy makers should appreciate the role of these traditional organizations and institutions and build on them in their policy design.

5.2.1 Managing the Risk of Drought

Toulmin (1994) sub-divides drought cycles into four phases based on the relationship between forage production, livestock numbers, grain price and livestock price (Figure 9). Each phase requires different interventions for moderating the impact of drought on pastoral livelihoods (Table 8). In the preparedness and the emergency alert phases risk mitigation measures should be put in place while in the emergency and post emergencies phases risk coping activities need to be implemented.

Figure 9: *Drought phases based on forage & livestock production and livestock & grain prices.*



Source: Toulmin 1994

Table 8: *Phases in the drought cycle and related activities.*

Phase	Activity
Risk Preparedness	Longer term interventions to enhance resilience: • Establishment of financial institutions • Provision of animal health services • Establishment of dry grazing reserves
Emergency Alert	Mitigation activities: • Provision of access to emergency grazing • Provision of contingency feed • Livestock banking • Livestock marketing interventions (early purchase)
Emergency	Relief activities: • Emergency purchase of livestock • Provision of food and / or cash aid • Shelter
Rehabilitation	Rehabilitation activities: • Credit provision • Restocking programmes • Establishment of alternative Income generating activities

The intervention options depend very much on the timeliness of detecting the first signs of stress. The development of forecasting technologies bears the opportunity to develop efficient livestock early warning systems (LEWS), which enhance the possibilities of preserving the livelihoods of pastoral people through the drought cycle. However, monitoring systems, such as the Spot satellite earth observation system (Spot image 2005) and the derived normalized vegetation index (Infocarto 2005), allow forecasting forage availability only in conjunction with supplementary ground-based information on pastoral livelihoods, such as trends in livestock production, off-take and prices (Sommer 1998). Monitoring information, however, needs to be coupled to rapid response capacities. For example, due to the delayed response in Turkana in 1992 average malnutrition rose from 16 to 38 percent in just three months (Buchanan-Smith, 1992).

Contingency plans forge the link between early warning and rapid response by linking the early warning indicators of the different phases with preset emergency interventions. LEWS thus encompass a larger development approach including the development of drought cycle preparedness plans. One of the most well-known contingency plans is that developed in Turkana following the devastating experience of the early 1990s (Box 1).

Box 1: *The Turkana Livestock Early Warning System.*

In 1984/5 OXFAM prepared a Drought Contingency Plan for Turkana District, which later formed the basis Turkana LEWS established in 1987. Under the sponsorship of the Arid Lands Resource Management Project of the World Bank, the LEWS has been extended between 1992 and 2001 to cover an additional nine districts, which include Marsabit, Samburu and Isiolo.

The system relies on the monthly monitoring of the livestock economy, the environment and human welfare. LEWS collects monthly rainfall statistics and is supplied with satellite imagery and associated forage resource analyses by the USAID-funded famine early warning system (FEWS). The monitoring system further draws on monthly surveys of 30 to 40 households per district to assess livestock production and prices. Additionally, each quarter community meetings are held to review community resources and activities.

The early warning system has four phases: 1. normal, 2. alert, 3. alarm and 4. post-drought phase. Each phase is linked to a pre-programmed response as part of the drought contingency plan. Potential responses include: emergency veterinary campaigns, livestock purchase schemes, food-for-work, restocking, relief feeding, and nutritional and health support.

The LEWS and the contingency plan are managed at district level by a drought management committee, which is linked with pastoral associations and communities. Because of its comprehensive nature the information is also used for regular district planning.

Source: Toulmin 1994; Eyapan 2001; Hogg 1997

As the majority of LEWS are set up with financial support from international organizations (donors and NGOs), the sustainability of LEWS has become a concern (Scoones 1994b). Major issues are the weak institutional infrastructure of many sub-Saharan African countries, and that the design and the establishment of LEWS are often extremely complicated and costly, and hence prohibitive for most governments in the region. Therefore, LEWS should be kept as simple as possible and combined with capacity building of local governance. Response mechanisms can work fastest if access to a contingency fund is not hampered by lengthy administrative procedures.

There appears to be a general need to strengthen government institutions that are responsible for early warning and response in pastoralist areas. National disaster preparedness plans which clearly lay out the responsibilities of different actors in the event of natural disasters should be developed. In the Greater Horn of Africa so far only Kenya and Ethiopia have established a national Early Warning System, with decentralized management at the district level and a national disaster preparedness plan (Table 9). Regarding the involvement of different organizations, piecemeal responsibility for early warning systems must be avoided as this often generates more problems than it solves. The initiative of the Mombasa Workshop (Kenya 2001) to develop a regional database that contains information on who is doing what to facilitate regional exchange of information with the aim of building a regional early warning system is a promising step towards mitigating the negative effects of droughts, especially in conflict prone areas like southern Sudan.

Table 9: *Responsibility, scope, management and state of national disaster preparedness policy in the Greater Horn of Africa.*

	Ethiopia	Kenya	Uganda	Somalia	South Sudan
National Disaster Policy	National Policy on Disaster Prevention and Management. Transitional Government of Ethiopia, Oct. 1993	In the process of being enacted	In the process of being enacted	No national Policy	No national Policy
Scope	Nationwide EWS	Nationwide EWS	No nationwide EWS	No nationwide EWS	No nationwide EWS
Responsibility	District and national government	District and national government	District and national government	No state institution	No state institution
Management	Disaster Prevention and Preparedness Commission responsible to coordinate the national EWS through its Early Warning Department, chairing the National early Warning Committee	Kenya Food Security Steering Group and ALRMP. EWS is decentralized for data collection, analyses and dissemination. Decision making is centralized at national level	NGO's/UN agencies engaged in development of EWS	Somalia Food Security Analysis Unit FSAU	NGO's/UN agencies with their own EWS

Source: USAID, FEWSNet, CARE, FSAU, and PACE. 2001

5.2.1.1 Risk Preparedness Phase

In the risk preparedness phase herders are under no immediate threat as forage is available and no premonitory signs of drought prevail. However, as droughts are certain to occur sooner or later, in this phase risk preparedness strategies should be developed, which encompass animal disease surveillance for early detection of epidemics, creation of emergency grazing / fodder reserves, and set-up of financial institutions for pastoralists.

Livestock insurance to compensate for the loss of animals or reduced productivity related to drought is not available to herders in traditional pastoral systems because the incidence of drought losses is usually too high to make it profitable for private providers or prohibitively costly for pastoralist producers. Also, opportunities for fraud and moral hazard are abundant as there is little opportunity for 'on-farm' inspection of management practices and loss assessments.

This does not mean that financial institutions should be disregarded completely, as the establishment of appropriate financial institutions could encourage pastoralists to put aside some of the value stored in their livestock herds in good years into a bank account. When the inevitable downturn comes, the money in the bank will insure them against destitution and provide the capital for buying back into the system after the crash. Coppock (1994) estimated that in Ethiopia, given the value of livestock during the 1980s, if animals had been sold during the inter-drought period and cash banked and withdrawn to purchase grain during the drought, households would, on

average, only have liquidated one third of the livestock assets they actually disposed of. However, this concept has not yet been set into practice because several questions remain unsolved. For example, the ideal herd size to which the herd can be reduced in inter-drought periods and 'cash banked' to be of use when drought occurs still needs to be defined. A more general constraint is the lack of experience in microfinance institutions that can effectively serve the scarcely populated pastoral areas. The PARIMA research on five financial services associations in northern Kenya's Marsabit District finds that the associations experience high rates of loan and share capital delinquency, low rates of savings deposits, poor profitability, and a weak level of local participation. Furthermore, the demand for loans far exceeds the supply of savings as pastoralists are not taking advantage of the opportunity to convert livestock wealth into cash savings, even during a period of drought that brought considerable herd stress and relatively high off-take (Osterloh 2001).

Ndofor (1998) finds that well functioning informal savings and credit schemes exist in Northern Kenya and Southern Ethiopia, where pastoralists use trusted friends/shopkeepers as savings and credit institutions. Pastoralists deposit money with a shopkeeper when they sell animals and later withdraw money in cash or goods. Shopkeepers may also offer credit in kind or cash to be repaid when the next animal or animals are sold. This example of the informal institutionalization of a savings and credit organization suggests that, despite the remoteness of pastoral areas, microfinance institutions located in market centers can also serve pastoral people. Nissanke and Areetey (1998) support this view and show that rural savings mobilization is not necessarily correlated with the number of bank outlets.

Alternative microfinance models should be investigated further, with particular attention to the potential complementarity between micro-finance institutions and the traditional banking sector and their respective eligibility criteria. The policy and legal frameworks should be designed similar to those for credit union development so that government plays the role of facilitator and does not directly provide financial services to the poor.

5.2.1.2 Emergency Alert Phase

The emergency alert phase is associated with a fall in available forage, creating an imbalance between livestock numbers and forage availability and the price of livestock falls, as herders attempt to sell part of their stock before they starve. Concomitantly the price of cereals rises. Thus pastoralists not only loose their livestock due to increased mortality, but are also forced to sell more animals than usual for the same amount of staples because of the worsening livestock-grain terms of trade. The livelihoods basis of pastoralists is therefore at risk, especially if eventually they are forced to sell their breeding stock. This, for instance, was observed among the Borana during the 1981-84 drought: the proportion of females in livestock sales rose to 43.5 percent from 25 percent in normal years (Cossins and Upton 1987). During these periods of extremely low livestock prices rich entrepreneurs purchase livestock as an investment. At this point in time, intervention options concentrate, on the one hand, on the preservation of breeding assets, and, on the other hand, on reducing the vulnerability of livelihoods through market-support.

In this phase, market access is crucial to pastoralists as livestock mortality increases exponentially if pastoralists are unable to preemptively sell animals. In the droughts of 1991-92 and 1994-95, close to 90 percent of the gross reduction in herd sizes was attributable to mortality (Von Bailey *et al.* 1999). Coppock (1994) estimates that the 1983-84 drought in Borana, Ethiopia, reduced cattle density by 60 percent: 42 percent due to livestock mortality, 14 percent due to forced sale and 4 percent due to slaughter.

In case of drought, market interventions aim to stabilize livestock prices by inducing an early off take of livestock before they become emaciated and die. Recent

experiences in East Africa indicate that interventions that reduce the transaction costs of livestock marketing in pastoral areas can increase off take during stress periods (Aklilu and Wekesa 2001; Von Bailey *et al*. 1999). To date such interventions have primarily focused on subsidization of part of trader's livestock transport costs (Box 2). However, where transport only constitutes a small proportion of livestock trading costs, as is often the case with cattle trekked to markets, additional incentives may be required, such as provision of feed and water to trekked animals. Additionally, a moratorium on livestock market taxes in times of drought might be considered.

Box 2: *Support of Marketing during Drought.*

The Arid Lands Resource Management Program (World Bank) aims at developing a marketing system linked to LEWS technologies in order to facilitate off take during early drought phases. The investments of the Arid Lands Resource Management Project in marketing and market information include a transport subsidy. This subsidy is intended to stimulate livestock sales at the onset of a drought rather than later, when prices have collapsed. The subsidy was based on a pilot experience in Isiolo district in 1996, when a 40 percent subsidy on the cost of transport to Nairobi was paid to traders, to induce them to buy cattle in remote parts of Isiolo. Some 3,000 cattle were purchased at KSh 6,000/head (USD 105) representing a gross injection of KSh 18 million (USD 315,000) into pastoralists' pockets, at a subsidy cost of KSh 2.5 million (USD 43,750).

Source: Reij and Steeds 2003

Strategies aimed at timely de-stocking and re-stocking of livestock should remove animals from the land sufficiently early in a drought to avoid long–term damage to vegetation and soils, and ensure rapid reconstitution of the livestock economy in the post drought period (Toulmin 1994). The pivotal issue is how to sustain livestock through the drought to the recovery period. As pastoralist economies take a long time to recover after drought if breeding females are scarce, preservation of the latter is widely recognized as a key aspect of early drought management strategies. (Towards the end of drought, herders are unwilling to sell female livestock and the few breeding females on the market are poor and overpriced (Blench 2001)). Strategies to preserve livestock include the movement of breeding stock to less affected areas, the establishment of cattle camps, and / or subsidized transport of fodder to breeding stock.

As mentioned earlier, long-distance opportunistic movement is becoming increasingly constrained, notably through national frontiers, the expansion of cultivation and increases in livestock numbers.

The first cattle camps were established by parastatal agencies with the intention of stabilizing domestic meat supply. In many cases, however, they failed due to mismanagement and corruption and cattle camps were abandoned. They are however being reconsidered, this time with the goal of preserving livestock capital, especially the valuable breeding stock.[21] Heath (2001) investigates the feasibility of establishing

[21] The NPDPM National Policy for Disaster Prevention, Preparedness and Management of Ethiopia (Hogg 1997) mentions the possibility of establishing cattle camps where vulnerable animals can be cared for in proximity to fodder and water.

cow-calf camps on private ranches as a drought mitigation measure (Box 3) and comes to the conclusion that the opening of ranches in times of drought and/or the establishment of ranches for this purpose offer an opportunity for pastoralists to preserve their most valuable breeding animals.

Box 3: *Cow-calf Camps on private Ranches.*

In Kenya, the drought in 2000 forced many pastoralists onto private ranch lands and into protected areas. After initial conflicts with the owners of ranches, a series of meetings led to an agreement by which the private ranches would each accept 200 breeding animals for the duration of the drought. This catered for less than 2,000 cattle. There are now plans to purchase or take over existing ranches for the specific purpose of protecting pastoralist breeding stock in the event of drought; three government-owned ranches in Laikipia are considered for trial.

Furthermore, long-term contracts with ranchers are being developed: five ranches agreed that a defined number of animals could to graze on their land in return for grazing fees of approximately USD2.00 per head/month. This would cater for approximately 1,500 breeding stock.

Source: Heath 2001

If livestock cannot be moved to fodder then the obvious alternative is to move fodder to the livestock. The availability of industrial by-products such as oil seed cakes and molasses has begun to change the traditional pastoral system and especially owners of larger herds are gradually taking advantage of this. But moving bulky fodder over long distances is expensive and its provision in only economical if restricted to a selected group of high-value animals.

Subsidies on feed as drought relief have become established in some countries. The experiences with feed subsidies in North Africa have shown the difficulty of appropriate targeting: the major share of the subsidized concentrates went to large herders and commercial farmers (Hazell 2000). A self-targeting strategy to deliver feed subsidies to the poorer herders so as to enable them to keep their breeding stock, is the delivery of feed in exchange for destocking of mature male animals during the drought alert phase. This has been practiced by the DFID-funded ACK-MDO project in Marsabit, Kenya (Box 4).

Box 4: *Feed Subsidies combined with De-stocking*

As part of its de-stocking programme, the ACK-MDO Agency in Marsabit provided partial payment for livestock in the form of 22.5 kg bags of feed, destined to enable weak breeding stock to survive. The bag would sustain one small stock over a three month period. For every three small stock a bag of feed was given, with the remaining balance paid in cash. It was estimated that the provision of supplementary feed concentrates during the drought is more cost-effective than buying animals after the drought is over.

Source: Aklilu and Wekesa 2001

5.2.1.3 Emergency Phase

In the emergency phase livestock numbers still fall as sales and deaths continue, despite the gradual improvement in relative fodder availability. In this stage livestock purchase cannot be arranged as a market intervention, but has to be bought as a relief intervention to provide a direct income transfer to pastoralists. Livestock prices will have plummeted and the livestock will be purchased to salvage some remaining value by slaughtering them after purchase. The meat will either be dried and sold or distributed directly as famine relief supplement.

Recent experiences from emergency purchase in Kenya shows that distributing fresh meat is cheaper than distributing dried meat, particularly if the live animal is slaughtered and distributed by the beneficiary communities themselves (Aklilu and Wekesa 2001). Any meat salvaged could be distributed to local schools, hospitals, vulnerable groups etc. The hides and skins could be sold in order to cover some of the costs of the operation.

Food aid becomes necessary if the national or regional grain markets are equally affected by drought. However, if local grain markets are unaffected by the drought, as was the case in Ethiopia in 2001, food aid to pastoralists could distort local markets and negatively affect grain producers. In this case cash transfers to pastoralists should be preferred. This has been recognized by the Food Aid Convention, which since 1999 allows commitments to be in cash as well as in grain. The targeting of cash transfers is more effective if linked to cash-for-work programs, which are unlikely to attract wealthier households.

5.2.1.4 Rehabilitation Phase

In the rehabilitation phase, fodder production has recovered but livestock numbers are well below the level which could make effective use of the available grazing resource. Pastoralist herds are depleted and livestock prices have risen enormously as demand for breeding stock by far outstrips supply. For the poorer pastoralists breeding stock are prohibitively expensive. Sandford (1983) points out that the traditional practice of pastoralism is at best semi efficient as after a drought much grazing is wasted, and that opportunistic tracking strategies could be 40 percent more productive if mechanisms to preserve livestock through the drought were in place. However, unless supportive measures were implemented in the emergency alert phase a majority of herders may be left with an unviable herd size after the drought.

A strategy to induce a redistribution of stock ownership after a drought is the introduction of restocking schemes. Heffernan (1998) estimates that in the 1990s approximately USD100 million have been spent on restocking programs in sub-Sahara Africa. Although Sandford and Habtu (2000) find this implausible, there is no doubt that restocking is attracting a significant share of disaster relief funding (Toulmin 1995).

In restocking programmes wealthy herders sell their surplus livestock to a managing agency which in turn hands them over to poor herders in form of a loan or grant. If livestock are bought on local markets, problems concerning ownership rights might occur; a common misperception is that restocking is a financial instrument to induce traditional stock loans (Oxby 1994). In a traditional stock loan one herder receives animals on the condition that the original animals are returned when they have produced offspring. Heffernan *et al*. (2004) report of cases where the former owners of animals, which were sold to a project, have demanded that the latter be returned by the restocked households.

A further recurring issue is that once poor herders have been given some animals, they are likely to sell some to satisfy immediate food needs. The animals will be sold to traders and owners of larger herds, at prices that are likely to be lower than the original purchase price. Thus, inequalities in access to livestock between richer and

poorer households might be exacerbated by restocking projects. Evidence from projects in Kenya suggests that the economic benefits to restocked families may be primarily short term, especially if households do not receive sufficient stock to reengage in pastoral livestock production (Heffernan 1997).

Initially restocking was viewed as form of relief aiming to rehabilitate the impoverished households into the social and economic fabric of pastoralism. Therefore targeted beneficiaries were destitute and marginalized pastoralists. However, after realization that restocking can only be successful if households receive sufficient livestock to sustainably re-enter the pastoral system, the few available breeding stock are distributed only to those households which can successfully reengage in the pastoral sector. This has evoked a shift in the focus of restocking programs, which are now implemented less as a form of relief and rehabilitation and more as a means of development: targeted beneficiaries are the marginalized and not the destitute pastoralists, which should be provided with alternative income generation opportunities. One option would be to induce the purchase of livestock from the destitute pastoralists, while at the same time establishing programs of alternative income generation. This would, on the one hand, provide destitute pastoralists with start-up capital and alternative income opportunities, on the other, ensure that marginalized pastoralists have access to female breeding stock and are not forced to work for absentee herd owners.

5.2.2 Managing the Risk of Animal and Human Disease

The management of animal and human disease risk should encompass both risk reduction strategies in form of disease prevention activities, and risk mitigation in form of disease surveillance and early reaction as well as risk coping through curative services.

Economic theory suggests that goods that are non-excludable and non-rival are public goods, which should be supplied by the state. Following the economic rationale, therefore, the management of the covariant risk of epidemics is responsibility of the state, while managing the risk of individual cases of disease is responsibility of the private individual. Although some social goods and services that serve specific basic needs are also considered public goods, there has been more pressure to reduce the government's role in curative animal health service delivery (as an economic service) than in human medicine (as a welfare one) (Leonard 2000a), resulting in the structural adjustment programmes of the 1980s.

A major weakness of the structural adjustment process of veterinary services in sub-Saharan Africa was the failure to re-organize state veterinary services, and use the savings derived from a withdrawal from the provision of clinical services to improve key public sector functions, such as supervision and regulation of private veterinary services or disease surveillance and early reaction to prevent the spread of epidemic animal diseases.

Box 5: *Division of public and private Responsibilities*

The risk-management of animal diseases involves activities which are responsibility of both the public and the private sector.

The public sector is responsible for the regulation of the entire animal health sector, which includes, for instance, disease surveillance, border inspection, drug licensing and monitoring of the animal health services. These are activities directly implemented by government.

Another responsibility of the public sector relates to the covariant risk of epidemics and includes, for example, vaccination campaigns for diseases of national importance. They are regulated, financed, co-ordinated, and monitored by government but can be implemented through sub-contracting to the private sector or through public–private partnerships.

The private sector is responsible for handling the idiosyncratic risk of individual disease, for example through the supply of drugs or clinical treatments. These services should be paid for by the beneficiary.

Source: Sinyangwe and Clinch 2002.

In order to reduce the risk of epidemics and mitigate their effects, the state animal health service needs to develop a reporting system, issue early warnings in case of disease outbreaks, develop contingency plans and intervene before the disease can spread. As diseases do not adhere to geographical borders, co-operation in disease control between neighboring countries is necessary.

Although the prevention of the covariate risk of epidemic animal diseases is state responsibility, the provision of an enabling environment for private veterinary services should be considered as equally important. As Perry *et al*. (2002) demonstrate the principal health constraints to improving livestock production comprise parasitic, respiratory, deficiency and multi-factorial diseases. With respect to the increased risk of animals weakened by drought being affected by parasites and viruses, the required intervention calls for relatively simple but regular and more targeted attention to individual herds and animals (Holden and Peeling 2004).

The need to reduce the costs of service delivery while at the same time making it profitable for the provider to serve the remote pastoral areas, has paved the way for the introduction of community based service delivery by paraprofessionals, such as for example community-based animal health workers. Community-based animal health workers (CBAHWs) are persons from the community trained to deliver health services for livestock kept by the communities.

The rationale for service delivery by community-based paraprofessionals is that transaction costs for locally provided services are minimized, and, that as paraprofessionals have lower income expectations than professionals, their services should be more accessible to the poor. CBAHW can act both as civil servants and as private entrepreneurs and therefore can reduce the costs for the public sector while at the same time increasing the outreach of private curative and preventive service delivery (Leyland and Catley 2002). Although the establishment of CBAHW is a promising avenue, they can only make a difference at national level if their roles are clearly defined and appropriate institutions to support and regulate such community initiatives are put in place.

Leonard (2000a) argues that the delivery of animal health services on a cost recovery basis requires some form of quality assurance because customers have considerably less knowledge and information than the providers and are therefore subject to fraud. This assurance is important because it influences livestock keepers' willingness to pay for services. As long as a livestock owner is reassured that a service improves the health status of his animals, he is willing to pay, and would even take up a loan[22] if

[22] A widespread practice is also the promise of the offspring of the cured animal.

necessary, as he will have sufficient confidence that the future income stream from the cured animal will offset the immediate expense.

A certain assurance of the quality of the CBAHW services can be achieved if the latter are trained and supervised by licensed veterinarians. However, in many countries veterinarians fear that animal health services will become dominated by paraprofessionals, who, once trained, will compete with them, escape their supervision, and reduce their role to that of pharmaceutical wholesalers (Leonard *et al*. 2002). This calls for ways to reconcile and build synergies between the interests of veterinarians, CBAHWs and farmer associations.

The International Animal Health Code of the Office International des Epizooties (OIE 2005) contains guidelines for the institutionalization and control of primary animal health care services. In particular, the code recommends the establishment of veterinary boards, which, among other things, are responsible for the development of a standard curriculum and the administration of a register of licensed CBAHW. So far, however, only very few countries have given legal status to CBAHWs (Table 10).

Table 10: *Legal recognition of community-based animal health workers.*

	Legal recognition of CBAHW	CBAHW may be allowed by ministerial decree	Legislation under review	Process at consultation stage
Countries	Guinea, Namibia, Republic of South Africa, and Sudan	Ethiopia	Eritrea, Zambia, and Zimbabwe	Tanzania, and Uganda

Source: Peeling and Holden 2004

An important feature that contributes to the effectiveness of CBAHWs is the community's trust in the individual. McCorkle (2002) shows that the local origin and residency of CBAHWs, his/her proven experience in stock raising, and the standing as a responsible and honest member of the community are the characteristics livestock holders value most. Therefore, selection criteria for CBHAW candidates should be elaborated according to these elements. Furthermore, Riviere-Cinnamond and Eregae (2003) in their study on the selection process of CBAHWs in Kenya find that the acceptance to the chosen individual is highest when the entire community is involved in the selection process.

While governments display some interest in safeguarding the health of pastoral livestock, they are not very committed to supporting the health status of pastoralists themselves. In 2001 the WHO Commission on Macroeconomics and Health (Global Health Commission 2001) emphasized that the health of a country's population is an essential pre-condition for its economic growth[23], and called on governments to increase health spending and to make their health systems more efficient.

In addition to reducing costs through the institution of paraprofessionals for animal and human health different authors point out that, especially in pastoral areas, the synergy between medical and veterinary services have to be considered when thinking about cost effective options to provide services to pastoralists (Butcher 1994; Majok

[23] The CMH report concludes that an annual investment of USD66 billion in basic health spending by 2015 would save 8 million lives per year in poor countries and provide an economic return of USD360 billion to global income (Global Health Commission 2001).

and Schwabe 1996; Meslin 1996; Nahar 2000; Schelling 2002; Ward *et al*. 1993; Wiese 2004; Zinstag and Weiss, 2001).

By sharing resources such means of transport, infrastructure (e.g. cold chains) and knowledge, mixed teams should be able to reduce the cost of services, for instance by conducting combined human and livestock immunization campaigns as well as by providing extension services on issues of human and livestock health (Huka Duba *et al*. 2001; Butcher 1994; Vedeld, 1994). The 'health for nomads' programme of the Swiss Tropical Institute in Chad (Box 6) provides a positive example of the feasibility of integrating animal and public health service provision in pastoral areas.

Box 6: *The Health for Nomads Programme in Chad*

In 1996 the Swiss Tropical Institute began a programme called 'health for nomads' in Chad, which simultaneously investigated morbidity of nomadic pastoralists and their animals. The investigators found that few nomadic children had been vaccinated against tuberculosis, and none had ever received a diphtheria-pertussis-tetanus, measles, and polio vaccine. By contrast, in the same nomadic camps, 75 percent of the cattle (compulsory vaccination) and most camels (voluntary vaccination) had been vaccinated against anthrax, blackleg, hemorrhagic septicemia, or contagious bovine pleuropneumonia over the previous two years.

The programme tested cross-sectoral interventions and conducted joint human and livestock vaccination campaigns in remote pastoral zones. This intervention was highly appreciated by pastoralists, who actively participated. A subsequent cost-benefit analysis showed that the public health sector could save up to 15 percent of infrastructure and personnel costs through joint delivery of human and livestock vaccination campaigns.

The program foresees the progressive extension of the concept of 'one medicine' to joint health services, arguing that mixed teams are best suited to serve the health needs of pastoralists.

Source: Schelling 2002; Daoud et al. 2000

As the pastoral way of life involves close contact between herders and their animals, it involves a comparatively high risk of transmission of zoonotic diseases, such as tuberculosis or brucellosis. Zinstag (2002) argues that it is likely that some of the two million cases of overt human tuberculosis that occur each year in sub-Saharan Africa are attributable to *M. bovis*, both because high rates of infection have been found in some animal populations, and because there is evidence that people affected by *M. bovis*-often looked after livestock or consumed non-pasteurized milk.

Radical supporters of the concept of 'one medicine' go beyond zoonoses and food hygiene and support an integrated and unique service for both animal and human health (Schwabe 1984; Schwabe and Kujok 1991). This, however, would require the development of a national or regional standard curriculum and a mechanism for joint licensing of the integrated community based human and animal health workers by human and animal health sector authorities. The controversial discussions surrounding the legal recognition of community-based animal health workers shows that already within one profession the definition and institutionalization of new roles are

constrained by differing political interests. For now, the linkage of human and animal health could be strengthened by targeting preferably women in the selection process for CBHHW and CBAHW, as they are positioned at the interface between animal and human health: they prepare food for the family, tend the young stock, collect the milk and dung, and are thus in the best position to identify sick animals.

A mixed team of veterinarians and physicians, sharing transport and infrastructure but fulfilling different tasks seems the most practicable way of combining the two services. Sharing the same infrastructure in mixed teams can further serve as a starting point to develop multi-focal leadership structures and slowly transform vertical disease prevention and control into horizontal mechanisms coordinated by a statutory body representing the interests of all stakeholders. This body should be granted financial resources and legal authority to deliver community-based human and animal health services with an integrated veterinary public health component.

5.2.3 Managing the Risk of Market Exclusion

5.2.3.1 Live Animals and Meat

Market access by pastoralists can be impaired by the occurrence of contagious, trade-inhibiting livestock diseases and by high transactions costs.

Twelve of the OIE List A diseases, which severely limit the possibility to export live animals and animal products, occur on the African continent. The requirement of 'disease freedom', as defined in the Animal Health Code, being a prerequisite for international trade of live animals and fresh meat has led many countries in sub-Saharan Africa to attempt to establish disease–free zones (for export). However, as in most countries many trade-limiting diseases occur simultaneously, freedom from OIE List A diseases on a zonal, let alone national scale is difficult to achieve and to maintain (Athukorala and Jayasuriya 2003). Establishment of disease free zones is particularly difficult and expensive in pastoral areas, where transboundary movements of livestock make disease surveillance and control extremely complex.

It is increasingly recognized that a 'zero-risk' approach to international trade with livestock products is unrealistic and the aim is to develop trade regulations that are based on the principle of 'maximum acceptable risk'. One approach is the development of a system for examination and certification of livestock for export. In East Africa, for instance, FAO is engaged in modifying the existing system of veterinary inspection and livestock export certification as a step in this direction. In West Africa, ECOWAS member countries seek to supervise and monitor animal diseases and trade by issuing a *certificat de transhumance*, containing information of the origin of the livestock, as well as a health certificate (ECOWAS 2005). Alternatively, Thomson *et al*. (2004) suggest that a commodity-based approach constitutes a pragmatic way of ensuring levels of acceptable risk for particular commodities, without the requirement of freedom from specific trade-inhibiting infectious diseases.

All above options, however, require investment in livestock marketing facilities, such as holding grounds, quarantine stations and market yards. In the course of the implementation of liberalization policies, discussions arose about which kind of infrastructure would be best be managed by private enterprises and which services should stay in public hands. While there is wide agreement that the supervision of hygiene standards should remain in the public sector, there is disagreement about who should be responsible for maintaining holding grounds and quarantine stations.

In addition to the risk of trade-inhibiting diseases acting as a barrier to markets pastoralists also face the risk of being displaced from their traditional export markets by global competitors due to the high prevailing marketing and transactions costs. Transport constitutes a major cost factor in livestock trading: livestock are trekked or

trucked to markets, with trekking being the predominant mode of transportation in West Africa (Williams 2002a; Bailey *et al*. 1999). However, trekking has high indirect costs due to animal mortality, weight loss, and trekker time as a result of stock routes and watering points being mostly in bad conditions and carries the risks of raids or conflict with farmers (see chapter 4.2.4) along marketing routes.

The public sector should reduce the transport costs imposed on traders and pastoralists, e.g. by investing in transport infrastructure (roads, trekking routes and water points). Although livestock are one of the most repeatedly (and perhaps the most highly) taxed agricultural commodities in Africa[24], livestock taxes and transit fees are rarely used to improve the physical structure or the efficiency of livestock markets. The governing principle should be to levy user fees and taxes on livestock producers and traders for visible, tangible services and for maintenances and upgrading of market facilities.

Traders are commonly scorned by producers and researchers to be exploitative. The producer's share of retail price shows a declining trend over time, particularly for cattle[25] (Janzen 1993; Stern 1999; Aklilu *et al*. 2002)**.** Aklilu et. al (2002) argue that in Sudan, Kenya and Ethiopia, the owners of butcheries are the most powerful group in the livestock marketing chain followed by middlemen, who act as the interface between traders and butchery owners. These two groups are reported to fix livestock prices in major domestic markets. In cases, where the margins made by middlemen, broker, butcher etc. are unreasonably high, a reorganization or regulation of the entire marketing chain, from producer to consumer, is recommended by AU-IBAR, which is supporting livestock trader associations as part of their Pastoral Livelihoods Programme (PLP2005). An option to regulate the market chain and increase the producers' share is to mobilize pastoral groups and institutions to participate in the formation of market associations under a marketing council, as is the case in Kenya (Box 7). However, close care has to be taken that these newly created formal organizations do not exclude less powerful factions in the market place (McPeak and Little 2006).

Creating an enabling environment for independent trading organizations should result in producers obtaining a higher share of the final price and, in some cases, even reduce the price in terminal markets. However, it has to be borne in mind that in many areas no major improvements can be gained by reorganizing the marketing chain, because the low prices offered by traders reflect the extremely high transport costs and other risks the trader faces. The opportunity for traders to exploit pastoralists only prevails in cases of low competition, i.e. when traders act as monopsonistic buyers. Monopsonistic buyers can establish themselves where transport costs are so high that poor(er) traders are unwilling to bear the financial risk to make the required journey, or where one group prevents the entry of others. Where institutions and infrastructure render livestock trading and transport competitive traders cannot capture extra rents (Staatz 1979; Holtzman and Kulibaba 1994; Sandford 1983). The policy question, therefore, is how to increase competition between traders in the most cost effective manner.

[24] In East Africa, in Sudan livestock traders pay taxes and transit fees in about 20 places en route to the terminal market (Aklilu et al 2002). In West Africa 28% of marketing costs are official duties and taxes (Williams 2002b).

[25] In Sudan, due to a convoluted livestock marketing chain that involves many middlemen, livestock prices in the terminal markets are 2 to 4 times higher than the producer's price. In Kenya, the producer's share varies between 47 and 52% depending on the butchery outlet. In Ethiopia, the producer's share has declined from 76% in 1983/84 to 55% in 1995 and to below 50% at present (Aklilu *et al*. 2002).

Box 7: *The Kenya Livestock Marketing Council.*

The Arid Lands Resource Management Programme (World Bank) has promoted the establishment of pastoral and livestock marketing associations at the grass roots and district level.

This effort has culminated in the registration of the Kenya Livestock Marketing Council. The Council is a private entity. Membership is open to all livestock traders upon payment of an annual membership fee of 500 shillings. Ten District Councils have so far been formed in predominantly pastoral areas.

The Council has set itself a number of ambitious objectives, which include:

- Advocacy for the rights of traders;
- Promotion of livestock and livestock product marketing from pastoral areas;
- Identification of local, regional and international marketing gaps;
- Enhanced dissemination of market information to both producers and traders;
- Support to entrepreneurs investing in slaughterhouses, cold storage capacity and other infrastructure that improves livestock marketing;
- Provision of extension services in liaison with the government;
- Fund raising for credit facilities and provision of group guarantees;
- Revitalization of traditional drought coping mechanisms.

Whereas these objectives are laudable, it has been observed in Laikipia that this institution has been misused by powerful factions of the market place, especially the large scale traders, who dominated the council and used it to harmonise their prices and to reduce competition.

Source: Aklilu et al. 2002; McPeak and Little 2006

Credit programs may be one way to facilitate entry into livestock trading, especially into cross border trade, which incurs higher costs. A study by ILRI in West Africa found that livestock trade is more competitive and functions better within countries (domestic segment) than between countries (cross border segment) and argues that this is mainly due to high capital outlay needed for cross-border trade and the unavailability of credit[26] (ILRI 2004a).

Another means to increase the competition between traders is to establish effective market information systems, serving both livestock producers and traders. An example of this is the GTZ Marsabit Development Programme (Box 8).

[26] Itinerant livestock traders in West Africa have a capital base of around 500 FCFA, whereas export traders require a minimum of 4.4 million FCFA. Export traders have been able to secure marketing margins two to five times higher than in the domestic segment (ILRI 2004a). At the time when the study was made US$ 1= 550FCFA.

At local level livestock auctions seem to be a promising option to influence price formation as auctions ensure that participants have equal information about livestock prices. Results of the GTZ-Marsabit Development Programme in Kenya, which has sponsored livestock auctions in several remote locations, show that prices paid for livestock by traders during auctions were significantly higher than those they had been paying before their introduction.

Box 8: *The Marsabit Market Information Programme (GTZ-MDP).*

For several years, the GTZ-MDP Marsabit Market Information Programme funded the collection, processing, and dissemination of market information for a variety of livestock species (prices by animal class and body condition). The dissemination of market information was initially limited to posting notices in Marsabit, Moyale, Korr, and Kalacha.

The information was used extensively, especially by traders. Market information was also broadcasted weekly on the GTZ-MDP and National Radio networks in the Rendille and Boran languages. The radio broadcasts were popular but had limited impact because of the few number of radios among the pastoral community. However, by the end of GTZ-MDP's sponsorship period, the Kenya Broadcasting Corporation was willing to continue broadcasting market information without charge due to the high demand for the information from people in the region.

Source: Bailey et al. 1999

5.2.3.2 Dairy

The exclusion of pastoralists from dairy markets stems from two different constraints. On the one hand pastoralists in remote areas have constrained access to milk markets and are forced to move closer to urban centers if they want to market their milk. On the other hand pastoral dairy faces a hard competition from imported milk products, such as skimmed milk powder, but also with more intensive peri-urban dairy systems.

Herders tend to move closer to the urban centers to get better access to the milk market. However, this reduces their herd mobility which not only negatively affects animal growth and milk production, but also increases their vulnerability to drought. Options to support these poor producers include the development of alternatives for livestock feeding such as silage projects, concentrates and fodder banks. However priority should be given to development interventions aimed at enhancing pastoral dairying such that it can co-exist with continued herd mobility by improving road networks or supporting of the development of milk collection centers.

The demand for pastoral milk is an important precondition for developing better market access for pastoral people. As Di Domenico (1989) ascertained for the case of Nigeria, consumers used to imported milk products are willing to pay higher prices for the latter. However, a potential for pastoral dairy exists in the informal market serving the growing urban demand as well as for niche products such as camel milk (Nori *et al,* 2003). In his study of formal and informal dairy marketing in the cities of Ibadan, Oya and Anambra in Nigeria, Di Domenico (1989) observed that Hausa enclaves in the cities are also the main outlets for traditional dairy products from the north. The trans-regional trade in traditional dairy products is mainly operated by Fulbe

women, who transport their products by train or truck to these areas, where they have established 'milk depots' for receiving northern dairy products.

Comparison of the milk marketing systems in Sudan and Somalia with that of Kenya, where pastoral milk marketing is of minor importance, corroborates that demand for pastoral milk is the limiting factor to market participation. In Somalia, professional milk traders have established milk trading centers along the main migratory routes used by nomads (Herren 1990; Little 1989); in Sudan, increased urban demand for milk and cheese has led to the creation of mobile cheese factories, which ensure an all-year round supply of cheese to urban centers by following the nomads along their migratory roads (Michael 1987). In Kenya by contrast, changes in pastoral mobility have had little effect on the supply of pastoral dairy products, as demand for dairy products is adequately met by non-pastoralists operating both in the formal and informal sector. Therefore there was no incentive to engage in improving market access for pastoral dairy.

5.2.4 Managing the Risk of Violent Conflict

Conflict management encompasses both conflict prevention and conflict resolution to mitigate the effects of conflict (Cousins 1996). Traditionally, the response to conflict was fixed on resolution. However, the policy paradigm is now shifting and there is a growing recognition that conflict prevention strategies are probably more effective than resolution-oriented strategies.

5.2.4.1 Conflict Prevention

Conflicts can be prevented through the establishment and enforcement of rules over natural-resource use, collective acceptance of such rules, and continuous negotiation of diverging demands. The regulation of access to natural resources should aim both to prevent degradation and violent conflict. Community-based natural resource management including all user groups in the negotiation process about the rules of access is a promising option for conflict prevention between conservationists, pastoralists and farmers. Equally important are measures to overcome the widespread marginalization of pastoralists.

Regulating Access to Natural Resources

The conservation of natural resources in sub-Saharan Africa has so far largely been based on the National Park Model classified as Protected Area Category II[27] of the International Union for the Conservation of Nature and Natural Resources (IUCN and UNEP 1986), which emphasizes undisturbed wilderness and, therefore, excludes all human activities for resource utilization. This, however, creates tensions with pastoralists as it limits income opportunities.

New approaches to address the conflicts between conservationists and pastoralists derive from a dynamic concept of rangeland ecology as well as from changes in conservation philosophies. Studies of rangeland dynamics and resilience have provided evidence that natural resource management is less ecologically damaging if pastoralists are not excluded entirely from protected areas, but are granted access to agreed key sites and buffer zones for grazing and watering (Boyd *et al*. 1999). In some countries of southern Africa, increased number of wild animals and related economic activities indicate that strategies of 'conservation through use' and complementary management of wildlife and livestock can be successful (e.g. Kiss 1990).

27 IUCN (1986) has put together six categories of protected areas and their characteristics in an effort to harmonise and document global conservation strategies.

Complementarity of wildlife and livestock has been observed in forage use. For example, giraffe, which browse up to a height of 5 m or more, keep the Savanna open and thus create room for shrubs, smaller trees and herbaceous vegetation, which serve as feed for livestock. Grazing by livestock on the other hand can also be beneficial for wildlife as moderate grazing favours plant biodiversity and grazing around wetlands brings additional nutrients into these areas, which can then support higher populations of water birds and/or fish (Brouwer 2001).

Livestock and wildlife can also complement each other in economic terms. The proceeds from trophy hunting and game viewing can easily exceed those from livestock keeping and thereby provide a means to ease the pressure on natural resources. In eastern and southern Africa, for instance, wildlife constitutes a significant element of national income, notably in Kenya, Tanzania, Zimbabwe and South Africa[28]. However, although revenue-sharing systems have been put in place in some areas and despite their promotion by aid and development agencies, their contribution to livelihoods in these regions remains extremely small (Blench 2001).

Wildlife enterprises require establishment of user rights (Emerton 2001). Although privatization of wildlife and land open the door for commercial ranching, tourism and safari hunting in most cases this does not benefit the majority of the community. Commercial ranching, tourism and safari hunting, in fact, tend to benefit wealthier individuals, rather than resource-poor farmers as market entry requires a land area of at least 10,000 ha, good access and excellent wildlife viewing opportunities (Bourn and Blench 1999; Elliot and Mwangi 1997). Joint management schemes could potentially overcome this constraint. Therefore land/resource tenure that enables pastoralists and village-based communities to benefit from wildlife and protect them from incursions by commercial interests should be set in place (Bourn and Blench 1999).

Box 9: *Amboseli National Park, Kenya.*

The emergence of the group ranch system in the 1960's for communal pastoral tribes enabled the Maasai to become owners of land surrounding the Amboselli National Park in Kenya. However, conflicts arose when water supply was insufficient in critical dry periods, and the Maasai had no alternative but to return to their traditional sources of water and grazing inside the Park. Expansion of agriculture in areas around the Park and tourist facilities and a hunting ban inside the Park constrained the activities of the Maasai and led to an escalation of conflicts.

These developments have largely been attributed to the lack of financial resources and the institutional weaknesses of the Wildlife Conservation and Management Department, which guided wildlife management by top down policy decisions. In an attempt to improve the relationship between the government and landowners, the Wildlife Act was amended in 1989 and the Wildlife Conservation and Management Department was replaced with the semi-autonomous para-statal Kenya Wildlife Service.

The Kenya Wildlife Service drew up a new wildlife policy framework and development strategy building on co-management initiatives and

[28] In West Africa, the situation is different, as rangelands are virtually devoid of large herbivores and infrastructure, which makes the area unattractive for tourism and hunting (Chardonnet et al. 1995; Bayer and Ciofolo 2004).

partnerships with the communities outside the parks, thus enabling them to derive direct cash benefits from the presence of wildlife on their land.

With the establishment of wildlife sanctuaries attracting international tourism, investors lease areas from the Maasai, which thereby benefit directly from wildlife conservation.

Sources: Western, 1994; Wishitemi and Okello, 2003

The complementarity of human activities, livestock and wildlife is recognized in the IUCN Category V Protected Landscape (IUCN 1986), defined as an area where the interactions between people and nature have produced some 'distinct character', should allow making use of the complementarity of wildlife and livestock. Although Category V would fit many landscapes in sub-Saharan Africa, it has rarely been applied. With the recognition of the complementarity of wildlife and livestock this model should become more relevant. The application of the protected landscape model in Amboseli, Southern Kenya, has induced its upscaling and replication (Box 9).

Regulating Access to Natural Resources between Pastoralists and Farmers

The model of key-site management by community-based organizations is a promising option for sustainable range management, which can prevent conflict among pastoralists as well as between pastoralists and farmers (Box 10). In arid and semi-arid areas, variation in soil type and topography result in very patchy pasture production (Swallow 1994). Therefore, resources to be managed include wet season grazing areas and key-sites, such as dry season reserves, drought reserves, swamps, water points, lakes, salt-licks, micro patches for fodder production or cereal cultivation. The management and preservation of the key-sites is of prime importance: on the one hand, access rules determine the way in which economic agents utilize these resources; on the other hand resources in the key-sites are often more endangered of degradation and encroachment.

Wells of various types are key for the maintenance of livestock, particularly in the dry season when herds need to stay within a radius of 15 to 25 km wells to be watered. Therefore, access to pastures is determined by rules of access to wells (Thébaud and Batterbury 2001). Traditionally, pastoralists dig their own wells and watering points in grazing areas (Taylor 1996). The introduction of modern hydraulic systems (boreholes since the 1950s and cement lined wells since the 1970s) has modified property regimes and increased the number of animals that can be supported by one water point. Although changes in resource access following borehole investment is of concern, Hanan *et al*. (1991), in their assessment of desertification around deep wells in the Sahel, show that the cost of the bare zones immediately surrounding each borehole is usually far outweighed by the benefits of more efficient fodder use.

Box 10: *Components of the Keysite Management Model.*

The key site management model includes the following components:

a. Clear and secure tenure of the key resource by a cohesive group (primary user group).

b. Definition of rules and regulations for the use, management and maintenance of the resource by the primary user group.
c. Identification of other users and establishment of regulations governing relations among users.
d. Identification of appropriate sanctions and punishments for transgressions and delinquencies.
e. Mobilization of human and capital resources for the implementation of the management plans.

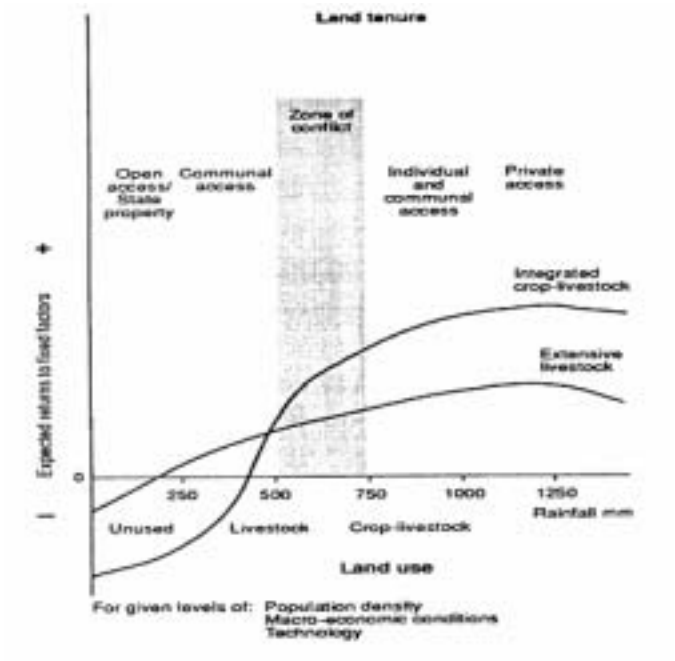
Source: Niamir-Fuller 1993

In areas with a more favorable agro-ecology, such as valleys and wetlands, less resilient plants can grow. These plants need more than one good season to recover (e.g. annual or biannual grasses), and sometimes more than ten to twenty years. Enhancing or even creating key-resource-areas by Investing in these key sites, therefore, could be a practicable way to improve the primary productivity of rangelands (e.g. investment in fodder management, planting of fodder shrubs and trees, reseeding) by leading to productivity enhancement in good years and offering survival feeding in poor years (Scoones 1994 b).

Their higher agricultural potential make key-sites particularly endangered to encroachment by farmers. It has been recognized that key-sites are best managed if exclusive property rights are granted to selected groups from the total 'universe' of users. At the same time, larger groups, composed of these smaller groups should be responsible for the management of the surrounding rangelands which are accessed as common property. This view acknowledges that due to the unpredictable nature of productivity in African drylands flexible non-exclusive tenure systems are required, which allow herders to move at short notice to areas of higher productivity (Behnke and Kerven 1994) and that the flexible management response is best achieved through common property rights[29]. The relationship between agro-ecological conditions and property regimes are described by Swallow (1994) in the following diagram (Figure 10).

[29] Common property does not imply the open unregulated access to the resources, but represents an efficient form of resource management to reduce risks in an uncertain environment. Private property rights, in fact, would be of little value as they do not produce any certainty of income; instead, common property rights and fuzzy land boundaries allow users to access productive land with a higher degree of probability. The drier the ecosystem, the larger the incentive to manage natural resources communally (Behnke et al 1993; Niamir-Fuller and Turner 1999), also because the relatively low returns from the arid resource do not warrant the costs of organizing and enforcing more exclusive forms of tenure.

Figure 10: *Relationship between agro-ecology and socio-economic patterns.*



Source: Swallow, 1994 quoted in Scoones, 1994

A possible strategy to efficiently manage key-sites, would be to assign property titles to the priority users, who would be responsible for the management of the surrounding natural resources. Additionally, all pasture land should be marked by boundaries. This is a compromise between the necessity of catering for flexible responses through transhumant mobility and the need to safeguard pastures from encroachment. It is important to point out that boundaries around pastures do not imply that pasture land is strictly assigned to individual pastoral communities as was the case with the pastoral ranching projects in the 60's, but to a multiplicity of communities. Excessive interference with customary organizations of land use, in fact, often leads to disappointing outcomes (e.g. in the Borana highlands in Ethiopia, Box 11).

Box 11: *Customary and transformed Land Use Rights in the Borana Plateau.*

Transhumant pastoralism was the customary form of land use in the Borana Plateau (Ethiopia) in the 1950s. The use of rangeland was regulated at three administrative levels. The largest administrative unit was the *Madda*, established around a permanent water source, whose use was administered by a so called 'father of the well'. Each *Madda* was subdivided into *Ardas*, which were in turn subdivided into *Ollas*, comprising around ten households.

At each level leaders defended and negotiated the interests of their community in resource use. The grazing system was organized by regulating access to different pastures in different ways. The only area

which was customarily open to all was the *Forra* grazing area, mainly for grazing steers/bulls and non-lactating cows. Transit areas around permanent water were also treated as *Forra*. Access to grazing areas for lactating cows and sick and weak animals (*Warra*) was restricted to members of the assigned *Arda*. However, in case of drought, access could be expanded. The most individualized pastures were the calf enclosures, thorn-fenced pastures, used by *Ollas*. Access to these enclosures could be granted to other users only to periods of absolute forage scarcity.

In the 60's this customary organization of land use was disrupted through the imposition of a cooperative ranching system. In most cases, the creation of the pastoral associations did not take traditional *Madda* boundaries into consideration, so that different *Maddas* were either wholly blended into one pastoral association or parts of a *Madda* were assigned to different pastoral associations. Mobility soon became seriously constrained, culminating in disputes as people found it difficult to honour new boundaries. The following problems were particularly prominent: 1. Access to grazing areas outside an *Arda* - though in the same *Madda* - was severely restricted; 2. Grazing areas left behind to regenerate were no longer secure: they became accessible to in-comers of the same pastoral association, but from different *Maddas;* 3. Increased conflict of authority between traditional elders and the relatively young chairmen of the pastoral associations.

Source: Kamara 2000; Kamara et al. 2003

The key-site management model should build on the traditional natural resource management practices of pastoralists. The Niger Pastoral Code for example identifies the land to be exclusively used as pasture and thereby avoid encroachment by farmers (the northern limit described in Law 61-5 1961) and the subsequent 1993 Niger Rural Code is with it's innovative priority rights principle (Article 28) provides one of the more innovative codifications of natural resource management of the Sahel[30], which has been adapted by other West African countries (Bloch and Foltz 1999; Ly 2004).

Outside West Africa, 'pastoral' legislation as such is very limited, although in some countries norms protecting pastoral rights are embodied in the general land legislation (Uganda's Land Act 1998 and subsequent amendments; Mozambique's Land Act 1997; Tanzania's Land Act and Village Land Act 1999; Namibia's Communal Land Reform Act 2002). In Tanzania, for instance, the Village Land Act 1999 provides for village land to be allocated to communal use, including pastures, and for the issuance of customary land rights to pastoral people (Alden Wily, 2003). On the other hand, some African countries have embraced policies attempting to abrogate customary systems, such as the Eritrea's Land Proclamation Act 1994 and Burkina Faso's Réorganisation Agraire et Foncière 1984, as amended in 1991 and 1996 (Alden Wily, 2003).

[30] The pastoral rights in general and the land tenure rights in particular are part of the 1993 Niger Code rural de développement. Chapter II (articles 23 to 39) defines the right of pastoralists to use of pastures, including the priority right of access to water points along certain corridors in conjunction with the duty to build and maintain the water points (articles 50 to 56).

Table 11: *Comparison of land right legislation for pastoral development in West Africa.*

	Legal Code	Regulation	Potential	Constraints
Mali	Land Code of 1986 Charte Pastorale de Mali (loi n°004 - 2001)	Authorizes regional 'Commandant' to assign up to 10 hectares of state land to a local person for agricultural use. Article 4 confirms the right of pastoralists to use the pastures		Is not useful in managing conflicts between pastoralists and farmers, which involve thousands of hectares
Mauritania	Law on land ownership enacted in 1983 Code pastoral en Mauritanie (loi n°44-2000)	Abolishes all traditional forms of land ownership: all vacant and undeveloped land belongs to the state. Article 6 guarantees the right to use the pastures to pastoralists.	The possibility of government leasing land to pastoral cooperatives is explicitly recognized.	The abolition of traditional tenure and its individualization, plus the encouragement of private land development, encourages private land ownership to the detriment of pastoral groups.
Niger	Law 61-5 1961 Rural Code 1993 (ordonnance n° 93 015-1993)	Sets a northern limit above which farming is not allowed. Provides *de jure* recognition of customary tenure as well as allowing group registration of land.	Article 28 of the 1993 rural code allows recognition of priority use rights for pastoralists for pasture lands and water points.	Law has not been satisfactorily enforced; herders are often required to compensate farmers for crop damage caused by their herds, even beyond the northern limit established for farming.
Senegal	Décret n°80 268 - 1980	Usufruct or private ownership may be granted to a land user only if the land has been used continuously and developed by the user.		Law does not recognize pastoral use as an activity that develops the land. The ceiling of the amount of land that may be granted to a legal person or institution is too low to permit a legal allocation of grazing land to a pastoral association.

Source: Shanmugaratnam et al 1992; Bloch and Foltz 1999; Ly 2004

5.2.4.2 Conflict Resolution

Conflict resolution is a critical component of conflict management, especially in its aim to prevent conflict escalating into violence or war. Conflict resolution attempts to reach a peace agreement between the conflicting parties and is based on a number of principles, including dialogue, consensus, facilitation, reconciliation, arbitration, mediation, and adjudication (Pendzich 1994; Anderson *et al*. 1996). The conflict resolution mechanisms, therefore, not only focus on the object in dispute, but integrate issues of morality, kinship, identity and history. In this perspective, the contested resource is an entry point for the investigation of the actors' logic of action, the identification of contending interests of the opposing fronts, and the rationale on which alliances are based (Schlee, 2003).

The causes for conflicting interests turning into violent conflict are multiple, but all include the weakening of customary conflict resolution institutions. One approach to contain the likelihood of violent conflict, therefore, is to strengthen and modernize traditional conflict resolution mechanisms. An ITDG study on traditional conflict

resolution mechanisms in East Africa reports that pastoralists urge civil society to revitalize traditional conflict resolution structures within the context of the modern judiciary (Pkalya *et al*. 2004). On the other hand, there is also the need for government to recognize and support customary courts to enforce their rulings. The state, in fact, needs to define the mandate of local authority structures in procedural law with a focus on fostering institutional arrangements between local and central levels and letting these evolve through bargaining processes in political, administrative, and legal arenas (Øygard *et al.* 1999).

Above all, effective conflict resolution mechanisms depend on their recognition by all respected parties. This recognition can only be achieved if the opposing interests are fairly represented in the consultative process. Brockhaus (2003) shows that in Burkina Faso conflict management tends to take place through networks characterized by information gaps, hierarchical influence and distrust. Government and outside agencies, therefore, should facilitate the establishment of those external conditions, which enable and guarantee participation of all concerned actors at all levels in conflict resolution and management (from local to national and international actors). The GTZ Burkina Sahel Programme provides a successful example of how effective platforms for negotiation and consultation, which include all parties affected by the conflict, can be established (Box 12).

Box 12: *Establishing Platforms for Negotiation and Conflict Resolution.*

The 'Programme des Sahel Burkinabé PSB/GTZ' started in 1991 in Kishi Beiga with the aim to improve natural resource management. Kishi Beiga is a vast pastoral zone and is home to several different sedentary and semi-sedentary ethnic groups living in scattered villages and hamlets. Environmental degradation in the area and extensive in-migration has largely destroyed the complementarity between agriculture and livestock, and the two systems now compete for land.

Initially the project supported the development of a community based management system based on the 'gestion de terroir' approach. It was recognized, however, that this approach was not suitable for pastoral areas, because it focussed on village based planning. This led to the exclusion of transhumant pastoralists from the planning process. As a consequence herders were denied access to natural resources and conflict was rising.

Learning from this experience, a consultative committee was created, to act as a forum for representatives from every area, social group and sensibility. The committee unites representatives from 19 hamlets organized in three villages, supported by four decentralized outposts of the committee.

In the first year, the consultative committee drew up a set of rules for the use of resources such as post-harvest grazing, salt licks, access to water for the protection of trees and natural water points. The consultative committee, the outpost committees and representatives from each hamlet/area are responsible for following up and enforcing regulations. In the first instance, attempts are made to settle all disputes amicably, and they are only taken to the judicial authorities if this is not possible.

By making conflict resolution its primary aim, the consultative committee has gained considerable credibility with local people. It has

been instrumental in resolving disputes between Mallébé and Bella agro-pastoralists and transhumant Fulani over the management of utilities such as water pumps, which had been souring relations between these groups, and has also set up a system for amicably resolving disputes over damage to fields.

Source: Banzhaf et al. 2000

The enforcement of conflict resolution mechanisms is especially important in case of cattle-raiding, which is a broadly accepted practice for restocking depleted herds, accumulating bride wealth or in revenge for a previous raid. The only measure to prevent that this practice turns into violent conflict is the establishment of rules confining the predation to mutually accepted motives and establishing a priori mechanisms to manage conflicts in case the rules are violated. The strengthening and modernization of traditional conflict resolution institutions is therefore an important approach to contain the potential for violent conflict. The Pastoral Communities Harmonization Initiative in the Karamojong Cluster provides a prominent example of this approach (Box 13).

Box 13: *The Pastoral Communities Harmonization Initiative in the Karamojong Cluster.*

The Karamojong Cluster comprises several communities and pastoral ethnic groups (Upe, Piam, Tepes, Pokot, Dodoth, Turkana, Merille, Didinga, Matheniko, Nyang'atom and Jie). They occupy the arid and semi-arid areas in the Greater Horn of Africa. Since the marking of national frontiers, their territories are divided on the areas of North-eastern Uganda, North-western Kenya, South-eastern Sudan and South-western Ethiopia. Cattle raiding has been always part of the traditional socio-economic system and regulated by traditional institutions enforced by maternal authorities and the elder's councils. These institutions lost their effectiveness when national governments failed to recognize their power and authority. The Karamojong cluster now is facing a war-like situation, due to uncontrolled cattle raiding across country borders.

To achieve sustainable peace in the Karamojong Cluster, in 1999, the Pastoral Communities Harmonization Initiative of AU/IBAR started to support the reactivation and modernization of traditional institutions. The initial approach was to call for Border Harmonization Meetings bringing together NGOs, donors international agencies, senior representatives and traditional community leaders from Uganda, Kenya Ethiopia and Sudan. However, the Initiative soon recognized that an important group was missing in these meetings: women. Women do not only suffer from cattle raids, but they are also raped, maimed and loose their sons, husbands and animals; further, they traditionally had an important role as ambassadors of peace who bear powerful messages through songs, poems, dances and speeches to both their sons and husbands as well as to neighbouring communities.

The focus of the Initiative started therefore to concentrate also on the traditional role of women in order to revive their traditional institutions. One of these institutions is the alokita, a traditional

mechanism for a group of women to present a problem through speech, dance and song.

The Initiative was successful in reviving the alokita by initiating a Women's Peace Crusade. Under the Crusade, 100 women spent two weeks travelling from one community to another communicating to elders, officials, warriors and other groups their vision of peace in speech, dance and song. The Initiative gained momentum with the coming together of representatives from all the 14 groups of the cluster in series of meetings.

Source: Watson and Grahn 2003

However, the power of traditional authorities breaks down when the root cause of conflicts does not lie within a society, but is, for example, related to external market opportunities. This occurs when raided cattle can be sold to 'export' markets with considerable profit. The traditional cattle raiding is thus becoming commercial cattle raiding, whose main rationale is the option to make profit and not to overcome grievance. Therefore, commercial cattle raiding cannot solely be addressed with traditional pastoral conflict resolution mechanism, and policy makers should develop strategies transforming the entire livestock production and marketing chain.

A pressing issue in this context is to prevent that violent conflicts turn in to civil wars. As Collier (2000) points out civil wars are motivated more by greed than by grievance as factors leading to conflicts are typically generated by the opportunity to raise revenue to finance organized crime.

5.2.4.3 Overcoming the Marginalization of Pastoralists

Conflict prevention and solution are hampered by contradictory and incompatible problem perceptions, which often lead to biased decisions in favour of the more influential group. Poor understanding by policy makers of pastoral systems and the lack of political leverage by pastoralists to influence policy processes often underlie policies and development interventions that boost rather than mitigate conflict.

On the one hand, understanding of pastoral livelihoods needs to be enhanced among non-pastoral groups, while on the other hand, the capacity of pastoral groups to promote their interests needs to be strengthened by giving them a voice in national and international policy fora (Hesse and Ochieng Odhiambo 2002).

Empowerment of pastoral groups to promote their interests

Since the end of the 1990s, policy makers have been carrying out significant institutional reforms, including decentralization and privatization. The process of decentralization, and the underlying concept of subsidiarity[31], offers an opportunity to improve political stability and empower pastoralists. On the one hand, however, if pastoralists are a minority, local elites of farmers might benefit more than pastoral people by decentralization, as they will exert a stronger influence over local policy makers. On the other hand, political stability may become endangered when pastoralists constitute the majority in a 'decentralized' unit and pursue objectives of disintegration and compete among themselves, both within and between countries.

[31] Subsidiarity means that responsibilities are allocated to the level where they can be best administrated. In practice this implies a shift in responsibilities away from central to local authorities

Nevertheless, local governments need to be given freedom in their decision making and they should attempt to rely upon both customary and formal laws to prevent conflict between the state and pastoral populations. However, it is important not to romanticize customary pastoral institutions (Swift, 1994). The latter were not established to serve modern administrative purposes and can at best provide the basis for new mixed types of pastoral administrative structures (part customary, part formal)[32].

The organisation of pastoralists on different levels and in different committees in Wajir district, Kenya, provides a good example of how pastoralists can be empowered to defend their interests at district level (Box 14).

Box 14: *Pastoral Development in Wajir District (Kenya).*

Wajir district covers some 56,599 km² of arid lands and is home to a significant number of pastoral people. In the 1990s there has been a marked change in the nature of efforts towards pastoral development in the district. As budgetary problems emerged and Structural Adjustment Policies were introduced, the national government sharply reduced its role in the provision of services and decentralization policies were introduced. Since then all branches of government are represented at district level and their activities and those of NGOs are co-ordinated at district level in the District Development Committee (DDC), under the chairmanship of the District Commissioner (DC).

This policy shift has led to the creation of several pastoral associations (PAs), so that by 1995 a number of different PAs serving different needs had been created. However, the range of different community organizations being established soon created confusion at district level about their management and long term role. This issue was raised at a District Development Committee (DDC) meeting in May 1995 with the result that the Pastoral Steering Committee (PSC) was formed as a sub committee of the DDC to co-ordinate activities relating to pastoralists. The PSC has members drawn from the Veterinary, Livestock, Health, Agriculture, Water and Social Development Departments along with the co-ordinators from major projects engaged in supporting pastoral people in the area (e.g. EDRP Emergency Drought Recovery Programme World Bank, NPHC Nomadic Primary Health Care Programme, Oxfam's Pastoral Development Programme). Its main purpose is to better understand the needs of pastoralists and co-ordinate the roles of different government bodies in responding to these.

The institutionalization of a Pastoral Steering Committee (PSC) in 1995 can be seen as a major success. One of the PSC's most striking achievements was its influence on the district's development plan. A comparison of the plan for 1994-96 with that for 1997-2001 shows significant differences. The earlier plan mentions over-stocking, migration, and inappropriate management of natural resources as main concerns. It notes that the 'migratory nature of the people' is 'one of the major constraining factors to development in the district'. By contrast, the document covering the period 1997-2001 expresses

[32] In Tanzania for example, legislation is either principal or subsidiary. The former requires approval by parliament, while the latter, which also includes laws of local governments, carries equal force of law but it is not subject to approval by parliament. Therefore, it is relatively flexible, leaving window of opportunity for customary organizations to formalize their rules by subsidiary legislation and thereby receive legal recognition (Rutabanzibwa and Shayo 2001).

concern that irrigation in the South of the district may harm pastoralists' interests; it notes that herders' main asset (livestock) are not generally accepted as security for a loan; and it states that 'the creation of permanent settlements will be monitored and controlled to ensure that it does not destroy the current basis of pastoralism'. Both the content and the tone of the later plan are markedly different from the earlier one, and a reflection of the PSC's influence within the District Development Committee.

Source: Oxfam 2000

Giving Pastoralists a voice at national and international level

Currently, development strategies for pastoralists are largely neglected by policy documents, even in countries where pastoralists represent a large share of the population (Blench *et al*., 2003). Pastoralist organizations can facilitate the inclusion of herders' concerns and needs in national development strategies and the Peul Association of Northwest Niger, the Fulani association in Nigeria and the Afar Pastoralist Development Association in Ethiopia (APDA) are examples of pastoralist organizations that enable herder's needs to be expressed at regional or national level (Niamir 1993, Sylla 1994). In East Africa, Pastoralist Parliamentary Groups have evolved as influential in policy making (Kenya 1998, Uganda 1999 and Ethiopia 2003, PENHA 2005).

Pastoral people are also forming international organizations to defend their interests. Examples are the World Alliance of Mobile Indigenous People (WAMIP) and the World Herders Council / Conseil Mondial des Éleveurs (Table 12). Giving these organizations a voice at international conferences and meetings will contribute to changing perceptions and policy decisions on rural development. The participation of representatives of 26 mobile peoples from four continents at the 5th World Park Congress (WPC) in 2003 was the first large presence of pastoral organizations at international meetings[33]. Since then, a number of events giving a voice to pastoral people have been convened, examples being the World Symposium on Sustainable Development, the EcoAgriculture Conference, the World Conservation Congress, the World Parks Congress and the 7th Session of the Conference of the Parties of UNCCD.

A tangible outcome of the participation of pastoralist in these meetings are internationally recognized commitments and declarations, such as the Karen Commitment for livestock keeper's rights and the Dana Declaration on mobile people and conservation (Table 13).

[33] The Participation of these groups was made possible through the assistance of CEESP and TILCEPA, and financial support from UNDP, IIED, IUCN and the Dana Committee. Participants took part in a preparatory WPC workshop, which led to a number of further workshops throughout the WPC.

Table 12: *Global organizations / alliances for pastoralist.*

	Link	Foundation	Objective
World Alliance of Mobile Indigenous People (WAMIP)	http://www.iucn.org/themes/ceesp/WAMIP/WAMIP.htm#rep	5th World Park Congress (WPC) in Durban, South Africa in September: Twenty-six mobile peoples from four continents built on the ideas expressed in the Dana Declaration (2002) as a point of departure for their work. At the end of the WPC, they founded the World Alliance of Mobile Indigenous Peoples.	Assist and empower mobile indigenous peoples to maintain their livelihoods and cultural identity, so as to sustainably manage their common property resources and obtain the full respect of their rights.
World Herders Council / Conseil Mondial des Éleveurs	http://www.condial.org/	At the initiative of African Pastoralists – facing problems of livestock development in the Sahel and the Savannah – the World Herders Council (WHC) was founded in November 1997 in Dori, Burkina Faso. The General Secretariat is based in Lucerne, Switzerland.	Advocate for livestock keeping, which supports 'optimal production' without genetic manipulation or over-exploitation of the ecosystem.
Global Pastoral Programme (GPP) / World Initiative for Sustainable Pastoralism (WISP)	http://www.danadeclaration.org/text%20website/gppworkshopreport.pdf	The GPP was founded in 2002 at the First Session of the Committee for the Review of the Implementation of the United Nations Convention to Combat Desertification (CRIC 1) in Rome, where UNDP-GEF and the UNDP Drylands Development Centre identified potential topics of the programme. The GPP has later changed its name to WISP.	To enable sustainable land management by helping to remove policy and capacity obstacles, and to identify innovative ways to make drylands management sustainable with the contribution of livestock.

Table 13: *International declarations and commitments for pastoralists.*

	Link	Origin	Objective
Dana Declaration on Mobile Peoples and Conservation	http://www.danadeclaration.org/septemberpressrelease.pdf http://www.danadeclaration.org/text%20website/textindex.html	The Declaration is the outcome of an international meeting of social and natural scientists and NGOs that took place in Wadi Dana Nature Reserve in Jordan in early April 2002. "Mobile Peoples and Conservation: Crossing the Disciplinary Divide"; Wadi Dana Nature Reserve, Jordan 3rd -7th April 2002.	Promotion of a comprehensive approach to mobile people and conservation based on five principles: Rights and empowerment; trust and respect; different knowledge system; adaptive management; collaborative management.
Karen Commitment	http://www.ukabc.org/karen.htm www.pastoralpeoples.org	Leaders of traditional livestock and pastoral communities, government representatives, civil society organizations with a focus on livestock genetic resources, academics and livestock researchers met at the Conference of Indigenous Livestock Breeding Communities on Animal Genetic Resources in Karen, Kenya from 27 to 30th October, 2003. Organized by the League for Pastoral People and Intermediate Technology Development Group (ITDG)	Appeal to government and international organizations to commit themselves to the formal recognition of the historical and current contribution of pastoralists to food and livelihood security, and acknowledgement of the role of pastoralists in developing and conserving domestic animal diversity.

6. DIVERSIFICATION AND EXIT STRATEGIES

Even if all above risks faced by pastoralists/agro-pastoralist are suitably managed, in the longer term their wellbeing would decline as a consequence of growing human and livestock populations on limited and often degradated drylands leading to increasing imbalances between the demand for and supply of land and water. Therefore, while individual impoverished pastoral/agro-pastoral households can be helped to regain a viable and sustainable livelihood in pastoral areas, this is no longer true for the pastoral/agro-pastoral population as a whole. Complementary policies / strategies with the objective to reduce the imbalance between humans, livestock and the environment therefore need to be put in place.

Although different growth rates of the diverse pastoral populations entail different degrees of pressure on basic resources (see 4.2.5) there is wide agreement on the necessity to invest in the promotion of alternative, non-herding, livelihood options largely driven by appreciation of the inexorable human population increase on decreasing rangelands (Winrock International 1992; Sandford 1994; Coppock 1994; Heffernan 1997; Fafchamps *et al*. 1998; Morton and Meadows 2000; Pantuliano 2002, Little *et al*. 1999). Sandford points out that even though the traditional practice of pastoralism at current is at best semi efficient, and that efficient opportunism exactly tracking feed supplies in time and space could add 40% to the present productivity level, from an economic perspective it might be better to allocate resources to 're-equipping' (e.g. by education or capital assets) the expanding pastoral population for non-pastoral occupations rather than investing in measures to improve opportunism and restocking/destocking (Sandford 1995).

6.1 Traditional Income Diversification Strategies

Little *et al*. (2001) distinguish three different types of variables influencing herders' decisions to diversify and their choice of diversification strategies. Conditional variables (e.g. external income transfers, human population density, per capita livestock holdings and per capita availability of rangeland) determine whether the conditions are conducive to diversification. Opportunity variables (e.g. distance to cities and market towns, available services and infrastructure, education) determine the opportunities for diversification. Finally, local response variables (wealth differentiation, gender, age) facilitate or constrain the impact of the first two variables.

The conditional variables of increasing population on decreasing pastures combined with losses of livestock during drought have led to an environment which is conducive to income diversification of pastoralists. Morton and Meadows (2000) distinguish between involuntary and voluntary livelihood diversification: there are many poor households who are forced to seek supplementary and / or alternative income generating activities while a small group of wealthy herders diversify as they invest their accumulated savings.

Income opportunities vary by proximity to the nearest town (market center) which offers possibilities to engage in income generating activities. Additionally, access to education, information, credit and other infrastructure determines the activities a household can profitably engage in. To take advantage of the opportunities available in proximity to towns, households who are forced to or wish to diversify their income, follow two different options. They either let family members leave the pastoral system and migrate to towns so as to benefit from the remittances sent by those members, or the entire family moves to the proximity of the center with its entire herd. While the first option provides the possibility to further pursue the well established opportunistic tracking strategies, the second option restricts the mobility

of livestock, unless livestock mobility is maintained separately by other mobile people (Niamir-Fuller 1993; McPeak and Little 2004).

The chances to make use of opportunities for diversification are determined by the local response variables such as wealth and gender. Migration of individuals to towns in search of wage labour, for example, is mainly practiced by young men. As the out-migration of young men leads to a higher workload for the remaining women and children (e.g. in Somalia one in every four male members of pastoral households have migrated to the towns and cities), this option is more frequently pursued by richer than by poor families. Income generation opportunities practiced mainly by women and poor herders are typically more closely connected to the herding activities: they encompass, for instance, wild product collection (firewood, resins and gum), milk trade, alcohol brewing, petty trade, or production and trade of handicrafts (Nduma *et al*. 2001; Brockington 2001; Smith 1998).

Wealthy herders have high income generating options as they can continue and expand their herding activity and, at the same time, invest in trade, other businesses and education. They mainly engage in activities which are linked to pastoralism but require significant start-up investments, such as livestock trade, slaughter and processing of livestock products (e.g. leather, hides and skin). However, some wealthier pastoralists also own shops or retail businesses and some, though a minority, are also highly-skilled and work, e.g., for government ministries. By contrast, poor herders do not dispose of savings to invest in a business and can only engage in petty trade or wage-labor; but as they are also poorly educated they are employed as low-wage unskilled labourers, such as night watchmen, mining, stevedoring trade (Morton 1989; Waldie 1990). Therefore, poor herders are caught in a vicious cycle of low incomes, low mobility, and high food insecurity, which might eventually force them to leave the system (McPeak and Little 2004).

6.2 Policies / Strategies to Facilitate the Engagement of Pastoral People in Alternative Income Generating Activities

The policies / strategies to facilitate the engagement of pastoral people in alternative income generating activities should start from two angles. On the one hand investment opportunities for pastoral people need to be identified followed by the creation of access to credit and training in order to enable pastoral people to pursue the investment opportunity. On the other hand public sector investment in labour intensive infrastructure provision could create employment opportunities for pastoral people, while incentives schemes to train and hire ethnic minorities including pastoral people might be established for the private sector.

Access to credit for destitute herders as well as the creation, identification and promotion of investment opportunities are important strategy components for herders to engage in alternative income generating activities. These strategy components are especially aiming to enable poor herders to become self-sustaining again by investing in alternative income generation activities. Poor herders have not accumulated savings and access to credit is constrained by lack of collateral. In their research in Ethiopia, Kenya, Uganda and Nigeria, Freeman *et al*. (1998) found that credit for livestock holders accounted for less than 10% of all agricultural credit, none of which was given to pastoralists. The replication of the savings and credit model of the Bangladesh Grameen Bank was attempted by the FARM-Africa Pastoralist Development Project (Box 15). The experience from this project suggested that the Grameen Bank microfinance model can only serve destitute pastoralists in rural centers, while it is questionable whether it can be effectively implemented in remote rural pastoral areas, because the transaction costs in sparsely populated pastoral areas are much higher than in densely populated Bangladesh.

Box 15: *FARM-Africa Pastoral Development Project.*

The FARM-Africa Pastoralist Development project operates since 1993 in the arid and semi-arid lands of Kenya. It supports the diversification of livelihoods and alternative incomes. Limited access to financial capital and inadequate business management skills were major drawbacks for poor people, either to start up a business or to upgrade a micro enterprise. To address these constraints, the project introduced adult functional literacy classes, training participants in micro-enterprise management, and financial support to promote locally suitable enterprises and sustain group enterprises selling veterinary drugs or marketing livestock.

In 1998, the project introduced a savings and credit system based on the Grameen Bank model, which makes the group the guarantor for loans to individual members. Twenty three women formed a pilot group to benefit from the credit system. Single mothers or widows and women who already engaged in a small business received loans, which allowed them to build and expand their businesses, such as beading, processing and selling hides and skins, running butcheries and kiosks, and livestock trading. This system proved beneficial and the women built-up their confidence to seek money from other lending institutions. Women started contributing towards domestic family needs such as buying books, paying school fees and providing food for the family. After realizing its effectiveness, the project expanded the micro-finance approach to other groups and districts.

Source: FARM-Africa 2002

Having accepted that some livestock keepers should diversify, and that for this they need access to credit, it is necessary to determine which non-livestock investments will be acceptable and successful for pastoralists. Pantuliano (2002) points out that destitute pastoralists should be helped to undertake activities in which they can make use of the skills they already possess and of their links with the rural pastoral economy, which for instance could be the marketing of pastoral products (e.g. dairy products), leather processing, butchering or management of abattoirs.

The emerging market of ecotourism might also offer new opportunities for alternative income generation for pastoralists (e.g. tourist guides, hunter guides, drivers, cooks, campsite guards, handicrafts). However, an evaluation of the engagement of pastoralists in alternative income generating schemes in Serengeti National Park, the Ngorongoro Conservation Area in Tanzania and the Maasai Mara National Reserve in Kenya shows that pastoralists are not able to fully exploit these opportunities because they lack skills, credit and secure resource rights (Goodman 2002). The ILO-UNDP Jobs for Africa Programme aims at identifying income generating opportunities for destitute pastoralists (Box 16).

The development of investment skills is pivotal for the success of any intervention for alternative income generation. Destitute pastoralists often lack even the most basic skills needed to develop a business and manage a small or medium enterprise. Although primary and secondary education enhances both the ability of pastoralist to found a small or medium enterprise and their chances to obtain a sufficiently well paid job, it does not necessarily have a positive effect on herd management as it reduces the exposure of children to pastoral activities.

Box 16: *ILO-UNDP Jobs for Africa Programme.*

The ILO-UNDP Jobs for Africa Programme promotes poverty reducing employment strategies. The program started in 1997 and covers Burkina Faso, Cameroon, Ivory Coast, Ethiopia, Mali, Nigeria, Senegal, Uganda, Zambia and Zimbabwe. It consists of two main thrusts:

- Concentrating public investment on labour-intensive infrastructure projects that employ the poor and are located in poor areas
- Reforming capital markets to provide sufficient credit to the poor to finance self-employment and micro enterprises in both urban and rural informal sectors.

In co-operation with the Jobs for Africa Programme, the ILO-INDISCO Programme has developed an initiative in Tanzania Simanjiro District on how to incorporate specific pastoral livelihoods and employment promotion issues into the national employment policy and poverty eradication framework. The Programme addresses the current changes in the income generating activities of indigenous people, such as the Maasai, many of which move to urban areas to search for jobs. ILO-INDISCO has recognized the plight and problems of pastoral communities and has the objective to effect that the pastoral community is given more attention in the public employment sector as contemplated in ILO Convention No. 169 (ILO 1989).

Source: Bee *et al*. 2002

Krätli (2000) points out that any education policy is built around two different objectives: the full accomplishment of the herder as a human being within his livelihood and cosmovision, and the integration of nomadic groups into the wider national social and economic setting. These two objectives require two different approaches. The first objective builds on participation, empowerment and the development of educational programmes to strengthen the pastoral production system. This is best pursued through institutions consistent with the mobility of pastoralists, such as mobile schools and distance education programmes based on radio broadcasting. The second objective requires modernization, state building and advocacy for pastoral communities, which need a higher level of formal education mostly acquired in traditional schools.

In the Baringo District, Kenya, Little *et al*. (2004) found that homesteads in which at least one member has some secondary school or post secondary training earn considerably higher cash incomes, accumulate more savings, spend more on food purchases, depend less on food aid, and own more livestock than other homesteads. However, although better education increases the chances to get employed in higher paid jobs, Holland (1992) points out that education is not a precondition for employment, and that in certain labour markets investment in secondary education does not guarantee salaried employment. On the contrary, the increasing commodisation of cattle and labour is generating new jobs especially for the non-educated (cattle trading, waged herders).

7. CONCLUSIONS AND RECOMMENDATIONS

Pastoralism, the extensive, mobile grazing of livestock on communal rangelands, is the key production system practiced in the world's drylands. Our estimates indicate that there are about 120 million pastoralists/agro-pastoralists worldwide, of which 50 million reside in sub-Saharan Africa. Worldwide, pastoralists constitute one of the poorest population sub-groups. Among African pastoralists, for example, the incidence of extreme poverty ranges from 25 to 55 percent.

In sub-Saharan Africa, any attempt to achieve the Millennium Development Goal of halving extreme poverty therefore needs to include pastoral people. The crucial policy question is whether it would pay off to invest in pastoral development, or whether it would be more appropriate to design exit-strategies for pastoralists allowing them to abandon livestock.

Both of the above options should be pursued in parallel. On the one hand, the increasing pastoral/agro-pastoral populations on decreasing rangelands requires that policy-makers should develop and implement exit and/or diversification strategies for pastoral people. There are, however, also good economic reasons for investing in pastoral areas. First, pastoralism/agro-pastoralism is the best, if not the only, means to make productive and sustainable use of natural resources in arid and semi-arid areas that would otherwise remain unexploited. Second, pastoral/agro-pastoral people produce a large share of the meat supply in many countries of sub-Saharan Africa. Finally, although pastoral production systems achieve lower yields per animal than 'modern' ranching systems, pastoralism is more productive per unit of land than the latter.

This notwithstanding, investment in pastoral development has dropped in the last decades, because it is believed that pastoralists contribute little to the national economy. As there is a scarcity of quantitative information on pastoral people and their livestock output this paper attempts to provide some estimates by linking information on distributions of people and ruminant livestock to production system classifications and performance indicators. The results show that, although pastoralists represent a minority in most countries in sub-Saharan Africa, they contribute a significant share to regional livestock production. It is estimated that in Djibouti, Somalia, Eritrea, Sudan, Western Sahara, Niger, Mauritania, Benin, Chad, Guinea-Bissau, Guinea and Mali, countries that exhibit high poverty incidences, pastoralists not only own a major proportion of the national herd but also contribute a significant share to national meat production.

The dryland areas of sub-Saharan Africa where pastoral/agro-pastoral people make a living are characterized by soils with low organic matter and low nutrient content, subjected to extreme year-to-year variability in rainfall, which regularly takes the form of droughts. In the course of centuries pastoralists have developed effective mechanisms to survive in this erratic and risky environment. Traditional risk-management strategies include livestock accumulation, regular and opportunistic herd movements tracking rainfall, breed and species diversification, and herd dispersion between community members.

For a number of reasons these traditional risk management strategies have become increasingly ineffective over the past decades and poverty levels among pastoral populations have risen. First, increased human populations and the associated growing animal stock coupled to land degradation are reducing the relative abundance of natural resources. Second, the expansion of agriculture from semi-arid into arid areas (the 'greening' of the Sahel) and the common tendency to establish private property rights over land have reduced the mobility of pastoral people. Third, as the preferences of pastoral/agropastoral people have changed, their integration into markets has strengthened, and their exposure to market risks and to competition from large and often capital intensive production units has grown.

Pastoralists are therefore ever more vulnerable to a number of risks, which are beyond the direct control of individuals, households and communities. The prime challenge for policy makers thus is to create an economic and institutional environment, which reduces the vulnerability of pastoral people to risks and reverse long-term trends negatively affecting pastoral livelihoods. This environment should reduce conflicts over resource access and enable pastoralists to effectively cope with weather and market risks, escape out of poverty and contribute to economic development.

The Sustainable Livelihoods Approach (SLA) provides a framework for assessing how risks, shocks and long-term trends affect the livelihoods of pastoralists. The SLA first identifies the main assets of people, which encompass natural, physical, human, financial and social capital. The crucial assets for pastoralists are their livestock, access to land and water, and their social network. On the other hand, pastoralists are often poorly educated and have limited financial assets, which are typically constituted only by their livestock. The SLA then examines how pastoral people, given the broader economic and institutional environment, combine their assets for survival and production purposes.

Within the SLA framework, risks can affect pastoralists at two levels. First, some of the assets are *per se* subject to risks: for instance, a drought or an epidemic may significantly reduce herd size; ethnic conflicts may reduce social capital within the community. Second, the transformation of assets into welfare/income benefits is subject to risks as well: for example, encroachment of land by settled farmers may deprive pastoral people of access to water points; declining terms of trade for livestock might make their sale unprofitable.

Policy-makers face a challenging task when designing policies and strategies aimed at reducing the vulnerability of pastoralists, as many aspects of vulnerability and its reduction are still not fully understood and require applied research. A first important distinction policy makers should make is between *idiosyncratic risks*, which affect single households (e.g. the death of the main income earner), and *covariant risks*, which affect larger regions and even countries (e.g. a drought or an epidemic).

Policies designed to reduce idiosyncratic risks are embedded in the standard poverty reduction strategies formulated by most countries in SSA. They include, for example, schooling, public health programs and the establishment of micro-finance institutions. These measures aim at enhancing peoples' capacity to cope with specific individual or household risks, largely irrespective of their initial assets.

On the other hand, specific policies and strategies are required to address the vulnerability of pastoral people to covariant risks, which impact on pastoralists as a group, such as the risks of droughts, epidemics, market exclusion and violent conflict. These policies vary according to the risks they attempt to address, but should be based on some common principles. In particular, they should combine strategies for risk reduction, risk mitigation and risk coping. The most desirable outcome would be to reduce the probability of any risk to zero but this is unachievable. It is therefore necessary to concomitantly develop strategies that reduce the impact of shocks on the livelihoods of pastoral people, as well as strategies for their rehabilitation after a shock has occurred. However, even if all the idiosyncratic and covariant risks were reduced and mitigated, the average well-being of pastoral people would get worse as a consequence of the long-term growing imbalance between humans, livestock, natural environment and the technology available to improve the productivity of the pastoral production system.

A review of policies in countries of SSA suggests that major efforts have so far focused on dealing with the risk of droughts, epidemics, market exclusion, and social conflict. There are no blueprint solutions, but some interesting and innovative approaches are emerging. Kenya provides an example of the design and implementation of effective drought management policies, and on how pastoral people can capitalize on market

opportunities. Burkina Faso has developed successful approaches of managing conflicts between pastoral people and farmers in arid and semi-arid areas. Chad illustrates the cost-effectiveness of combining animal and human health service delivery to pastoral people in remote areas. Tanzania provides an example on how to incorporate specific pastoral livelihood and employment promotion issues into the national employment policy and poverty eradication framework. At the same time, of course, there are several instances of policies that have been ineffective and failed.

Although quite a few options are presented in this paper, which can and have been implemented successfully to address the vulnerability of pastoralists, several questions remain unsolved and require further research. Most of the options presented remain therefore first steps towards sustainable pastoral development, and need to be refined and adapted to regional specific features determining the different pastoral situations. The challenge of governments, multilateral and bilateral agencies, development banks and the livestock keepers is to design and implement policies able to reverse all negative processes impinging upon the well-being of pastoral households and make them actively contributing to rural development and economic growth. To this end, the following recommendations emerge from this study:

Addressing the Vulnerability to the Risk of Drought

The effect of droughts should be mitigated by public investment in an approach focusing to preserve livelihoods by setting up an early warning and response system which should:

- monitor satellite-based information of rainfall and forage availability combined with ground-based indicators on livestock production, livestock prices and herd movements in order to produce timely information for early intervention;
- be managed at the district level, and supported by capacity building at local level and local response mechanisms – ideally with a contingency fund;
- be coordinated regionally as suggested by the initiative of the Mombasa Workshop (2001) based on a regional database that contains basic information on who is doing what and facilitates regional exchange of information;
- link early warning to early response through contingency planning for the different phases of the drought cycle;
- include a phased response to the early warning of an occurring drought, which aims to preempt urban entrepreneurs to take advantage of distress sales by inducing an early purchase of livestock through incentives for increased engagement and competition in trading such as transport subsidies or tax moratorium at the onset of a drought;
- preserve livestock, especially breeding stock by early planning of long distance tracking and facilitating reciprocal agreements allowing herders in drought affected areas to access neighboring unaffected rangelands; establishing cow-calf camps; subsidizing feed as a drought relief preferably self-targeted by the delivery of feed in exchange for destocking of mature male livestock;
- support households threatened by food insecurity through the emergency purchase of livestock for slaughter; distribution of the meat as famine relief; giving food aid in case the local grain market is equally affected by drought while otherwise distribution of cash preferably through the self targeting mechanism of giving cash for work.

Risk coping and rehabilitation policies and strategies after a drought should support measures to:

- reduce famine by cash for work programs in case only pastoralists are affected and food for work programs if also farmers are affected;
- rehabilitate marginalized pastoralists by restocking measures;
- induce the sale of livestock from destitute pastoralists to marginalized pastoralists, by linking it with programs of alternative income generation, as this would on the one hand provide destitute pastoralists with start-up capital for alternative income generating activities while on the other hand ensure that poor but 'non-destitute' pastoralists have access to female breeding stock and are not forced to work for absentee herd owners.

Addressing the Vulnerability to the Risk of Disease

In order to reduce the risk of diseases/epidemics policy makers should:

- reduce costs and increase the outreach of service delivery by community based paraprofessionals, and support the legal recognition of community based paraprofessionals encompassing regulations for licensing and supervision as well as for purchasing drugs;
- promote closer collaboration between animal and human health service provision;
- consider the sharing of infrastructure and mixed teams of human and animal health workers as a starting point to develop multi-focal leadership structures and slowly transform vertical disease prevention and control to horizontal mechanisms.

Addressing the Vulnerability to the Risk of Market Exclusion

The risk of market exclusion should be addressed by:

- reducing the high transport and transaction costs though elimination of illegal road taxation, investment in public infrastructure such as roads, trekking routes and water points as well as provision of incentives for private investment in holding grounds;
- interventions that increase competition between traders, such as credit programs, market information systems and transparent market auctions which lower opportunities for monopsonistic traders;
- reorganization or regulation of marketing chains in areas where the margins made by middlemen, brokers, and butchers are unreasonably high through establishing independent trading organizations;

Addressing the Vulnerability to the Risk of Violent Conflict

Regarding the risk of violent conflict which could escalate into civil strife or war, conflict prevention policies and strategies should:

- support the establishment of decentralized institutions and sharing responsibility of resource management with local communities;
- strengthen community-based natural resource management in its capacity to follow the of key-site management approach, which builds on the priority of user rights approach;
- regulate the fair access to the diminishing assets such as drought grazing reserves and water by land titling in two complementary ways, namely by titling all key-sites to the priority, users who are responsible for the management of the surrounding natural resources, while marking the whole area used as pasture by boundaries;

- subscribe to an approach of integrated livestock wildlife management in protected areas;
- establish land/resource tenure that enables pastoralists and village-based communities to benefit from wildlife, and protect them from incursions by commercial interests;
- expose commercial cattle raiding as what it really is and develop means to stop commercial cattle raiding;
- empower pastoral organizations on different levels to voice their interests and to influence local, regional, national and international development strategies;
- enhance the knowledge of policy makers about pastoral livelihoods.

Policies and strategies to support conflict resolution should:

- revitalize traditional conflict resolution structures and link them to the modern judiciary system;
- put in place efficient mechanisms for policy negotiations by creating external conditions which enable and guarantee participation of all concerned actors at all levels for conflict management.

Addressing the Imbalance between Humans, Livestock and the Environment

Given the growing human and livestock populations and the increasing pressure on natural resources, decision makers should design policies and strategies to relieve pressures on limited land and productive resources. These should:

- identify investment opportunities for pastoral people and provide them with training and credit to pursue these investment opportunities.
- create a labour market for pastoral people. The public sector could invest in labour intensive infrastructure provision in pastoral areas and provide fiscal and other incentives to the private sector to train and employ ethnic minorities, including pastoral people.

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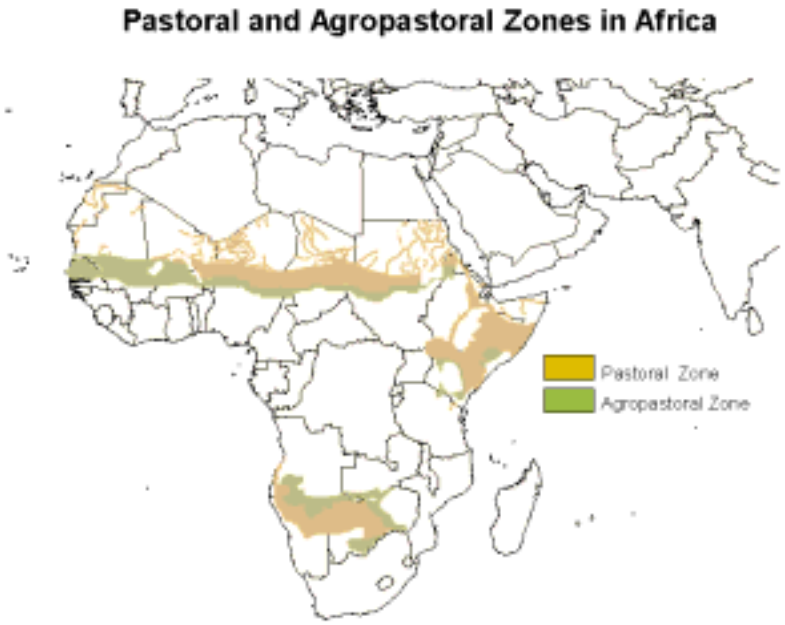
ANNEXES

Annex 1: Agro-ecological zones in which pastoralists and agro-pastoralists prevail



Annex 2: Number of 'livestock-only rangeland-based production systems' (LG) by geographic region (million)

Region	LGA (arid/semiarid)	LGT (temperate/tropical highlands)	LGA+LGT
Sub-Saharan Africa	42.0	3.3	45.3
West Asia - North Africa	35.4	0.5	35.9
South Asia	18.6	0.4	19
Central / South America	15.4	6.6	22.1
East Asia	4.6	17.0	21.6
Newly Independent States	0.8	7.4	8.2
South East Asia	0.0	0.5	0.5
Sum	116.8	35.7	152.5

Annex 3: List of countries by geographic region

Region	List of Countries
East Asia (EA)	China, North Korea, Mongolia
Central and South America (CSA)	Argentina, Barbados, Belize, Bolivia, Brazil, Chile, Colombia, Costa Rica, Cuba, Dominican Republic, Ecuador, El Salvador, French Guiana, Guatemala, Guyana, Haiti, Honduras, Jamaica, Mexico, Nicaragua, Panama, Paraguay, Peru, Puerto Rico, Suriname, Trinidad and Tobago, Uruguay, Venezuela
Newly Independent States (NIS)	Armenia, Azerbaijan, Georgia, Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan, Uzbekistan
South Asia (SA)	Bangladesh, Bhutan, India, Nepal, Pakistan, Sri Lanka
South-East Asia (SEA)	Brunei, Cambodia, Indonesia, Laos, Malaysia, Myanmar, Papua New Guinea, Philippines, Thailand, Vietnam
Sub-Saharan Africa (SSA)	Angola, Benin, Botswana, Burkina Faso, Burundi, Cameroon, Central African Republic, Chad, Congo, Democratic Republic of, Congo, Côte d'Ivoire, Djibouti, Equatorial Guinea, Eritrea, Ethiopia, Gabon, Gambia, Ghana, Guinea, Guinea-Bissau, Kenya, Lesotho, Liberia, Madagascar, Malawi, Mali, Mauritania, Mozambique, Namibia, Niger, Nigeria, Rwanda,, Senegal, Sierra Leone, Somalia, South Africa, Sudan, Swaziland, Tanzania, Togo, Uganda, Zambia, Zimbabwe
West Asia-North Africa (WANA)	Afghanistan, Algeria, Egypt, Iran, Iraq, Israel, Jordan, Kuwait, Lebanon, Libya, Morocco, Oman, Qatar, Saudi Arabia, Syria, Tunisia, Turkey, United Arab Emirates, Yemen

Annex 4: Estimated number of livestock in pastoral/agro-pastoral production systems and their percentage in the total number of livestock

	pastoral goat		pastoral sheep		pastoral cattle	
	number	percent	number	percent	number	percent
Chad	2,895,166	56%	1,311,413	56%	2,646,294	47%
Mali	4,244,211	43%	2,929,945	47%	2,365,148	36%
Nigeria	1,310,751	5%	1,227,857	6%	1,436,005	7%
Guinea	455,455	46%	352,801	44%	1,192,765	42%
Niger	5,683,333	86%	3,829,010	88%	1,137,404	76%
Mauritania	3,639,848	72%	5,640,673	70%	841,741	58%
Burkina Faso	1,601,892	19%	960,481	14%	784,648	16%
Benin	428,291	35%	224,421	33%	781,576	53%
Senegal	533,526	14%	869,599	20%	655,034	22%
Cote d'Ivoire	209,442	19%	185,336	13%	616,376	44%
Ghana	335,350	11%	214,317	8%	263,314	20%
Guinea-Bissau	57,782	22%	111,967	57%	184,634	37%
Gambia	13,136	9%	5,210	5%	16,902	5%
Togo	11,816	1%	11,313	1%	9,231	3%
Western Sahara	172,000	100%	33,000	100%	83	100%
Liberia	0	0%	0	0%	0	0%
Sierra Leone	0	0%	0	0%	0	0%
Sudan	18,322,142	48%	22,231,217	48%	18,098,422	49%
Somalia	11,074,675	92%	12,866,649	94%	4,353,026	85%
Ethiopia	1,307,186	15%	1,021,758	9%	3,326,658	10%
Kenya	4,406,668	44%	3,089,806	39%	2,877,269	25%
Tanzania	1,908,341	16%	589,252	17%	2,289,958	13%
Eritrea	761,666	45%	1,048,582	49%	1,130,000	53%
Uganda	108,387	2%	38,272	4%	257,249	4%
Djibouti	486,412	96%	455,864	98%	240,743	94%

Annex 5: Estimates of national meat production by livestock production system

Country		pastoral	semiarid mixed	humid/ subhumid	highland mixed	cattle ranching	Total production
Djibouti	cattle	2,840,763	28,348	0	0	0	2,869,110
	goat	1,118,748	28,932	0	0		1,147,680
	sheep	820,554	6,589	0	0		827,143
Eritrea	cattle	13,333,998	8,202,015	0	1,625,173	0	23,161,185
	goat	1,751,832	1,584,231	0	1,229,364		4,565,427
	sheep	1,887,448	2,690,165	0	409,020		4,986,633
Ethiopia	cattle	39,254,569	81,683,095	14,137,469	136,806,407	1,227,411	273,108,951
	goat	3,006,528	11,181,971	322,498	10,231,651		24,742,648
	sheep	1,839,164	6,413,819	481,165	19,036,530		27,770,678
Kenya	cattle	33,951,774	21,840,976	12,501,212	29,683,242	160,859	98,439,634
	goat	10,135,336	7,032,845	1,086,358	6,045,735		24,300,275
	sheep	5,561,651	3,930,596	668,496	6,552,708		16,713,451
Somalia	cattle	51,365,707	5,010,021	0	6,304	0	56,382,032
	goat	25,471,753	1,956,795	0	78,466		27,507,014
	sheep	23,159,968	1,563,345	0	40,520		24,763,833
Sudan	cattle	213,561,380	190,833,921	91,091	172,807	31,003,196	435,878,126
	goat	42,140,927	52,954,633	6,091,654	87,131		101,274,344
	sheep	40,016,191	62,121,221	4,100,140	87,188		106,324,740
Uganda	cattle	3,035,536	16,625,441	33,293,759	5,871,828	6,363,278	65,189,842
	goat	249,291	2,736,386	9,206,691	4,545,729		16,738,097
	sheep	68,889	707,735	942,048	598,750		2,317,421
United Republic of Tanzania	cattle	27,021,510	105,135,970	37,355,289	6,802,379	3,482,070	179,860,425
	goat	4,389,184	16,452,742	6,054,095	2,375,441		29,271,463
	sheep	1,060,654	5,504,642	779,308	833,641		8,178,245
Benin	cattle	9,222,594	5,999,852	1,600,801	0	520,272	17,343,520
	goat	985,069	1,536,305	799,127	0		3,320,501
	sheep	403,957	867,072	286,991	0		1,558,020
Burkina Faso	cattle	9,258,841	43,625,439	0	0	0	52,884,279
	goat	3,684,352	21,073,127	0	0		24,757,479
	sheep	1,728,867	16,823,920	0	0		18,552,786
Cote d'Ivoire	cattle	7,273,231	5,043,252	1,730,246	0	5,952,468	19,999,197
	goat	481,716	377,712	2,226,484	0		3,085,912
	sheep	333,606	371,177	2,075,413	0		2,780,196
Chad	cattle	31,226,264	32,617,923	0	0	0	63,844,187
	goat	6,658,882	6,686,785	0	0		13,345,667
	sheep	2,360,544	3,012,923	0	0		5,373,467

Country		pastoral	semiarid mixed	humid/ subhumid	highland mixed	cattle ranching	Total production
Gambia	cattle	199,441	3,566,749	23,006	0	0	3,789,196
	goat	30,213	365,362	0	0		395,576
	sheep	9,378	285,873	0	0		295,251
Ghana	cattle	3,107,105	7,103,225	3,178,300	0	3,642,030	17,030,660
	goat	771,306	3,160,967	4,543,701	0		8,475,974
	sheep	385,770	2,199,872	3,112,534	0		5,698,177
Guinea	cattle	14,074,627	3,192,603	13,472,446	1,521	4,931,627	35,672,824
	goat	1,047,547	358,998	1,152,121	249		2,558,915
	sheep	635,041	228,021	711,524	2,356		1,576,943
Guinea-Bissau	cattle	2,178,687	2,958,001	0	0	0	5,136,688
	goat	132,899	559,174	0	0		692,073
	sheep	201,541	228,334	0	0		429,874
Liberia	cattle	0	0	323,988	0	0	323,988
	goat	0	0	455,683	0		455,683
	sheep	0	0	309,147	0		309,147
Mali	cattle	27,908,746	44,834,700	901	0	0	72,744,348
	goat	9,761,685	16,229,411	0	0		25,991,097
	sheep	5,273,901	9,347,641	0	0		14,621,542
Mauritania	cattle	9,932,539	6,537,091	29,654	0	0	16,499,284
	goat	8,371,650	4,273,602	0	0		12,645,252
	sheep	10,153,211	6,794,330	0	0		16,947,541
Niger	cattle	13,421,365	3,812,214	0	0	0	17,233,579
	goat	13,071,666	2,742,267	0	0		15,813,933
	sheep	6,892,218	1,440,580	0	0		8,332,798
Nigeria	cattle	16,944,859	165,849,989	26,821,537	1,705,460	6,246,755	217,568,601
	goat	3,014,727	39,777,980	32,091,629	162,182		75,046,519
	sheep	2,210,143	38,569,678	11,556,902	321,408		52,658,130
Senegal	cattle	7,729,404	24,684,863	61,285	0	0	32,475,552
	goat	1,227,109	9,804,149	0	0		11,031,258
	sheep	1,565,278	10,212,246	0	0		11,777,524
Sierra Leone	cattle	0	0	4,367,664	0	466,795	4,834,459
	goat	0	0	588,353	0		588,353
	sheep	0	0	563,541	0		563,541
Togo	cattle	108,926	2,290,545	687,979	0	0	3,087,450
	goat	27,177	2,814,404	1,321,027	0		4,162,607
	sheep	20,363	2,931,734	1,069,916	0		4,022,012
Western Sahara	cattle	980	0	0	0	0	980
	goat	395,600	0	0	0		395,600
	sheep	59,400	0	0	0	59,400	

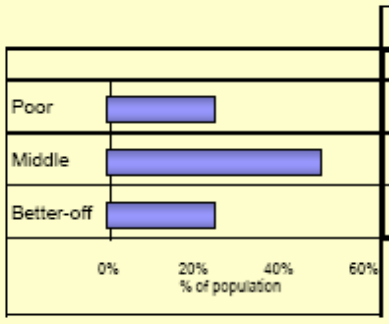
Annex 6: Approaches to estimate the numbers of poor in 'livestock-only grassland-based production systems'

	TAC defined poverty threshold[1]	World Bank rural poverty threshold[2]	Less than US$1 per day	Less than US$2 per day	World Bank rural poverty rate + LID system rates[3]
Sub-Saharan Africa	24.2	22.1	18.9	32.6	27.7
West Asia-North Africa	10.2	8.5	1.2	10.1	10.2
Central and South America	5.5	9.9	2.8	7.5	8.1
South Asia	5.7	7.0	6.3	15.8	5.8
East Asia	2.3	1.6	3.9	11.5	2.3
Newly Independent States	2.2	2.7	0.6	2.3	2.2
South-East Asia	0.2	0.1	0.2	0.6	0.4
Sum of poor LGA+LGT	50.3	51.8	33.9	80.4	56.7
% of poor LGA+LGT from all LGA+LGT	32.9%	33.8%	22.1%	52.6%	37.1%
% of poor LGA+LGT of all poor livestock keepers	3.3%	3.9%	2.7%	2.8%	10.2%

1: Based on national poverty lines from ILRI priority exercise (TAC) (Gryseels et al. 1997)
2: Based on rural poverty lines, as define by each country (World Development Report 200/2001)
3: derived by applying differential proportions of poor livestock keepers as a percentage of the total poor by livestock production system referring to poverty statistics in UNDP (United Nations Development Programme 1997) and studies on livestock ownership patterns by the LID (Ashley et. al. 1999)

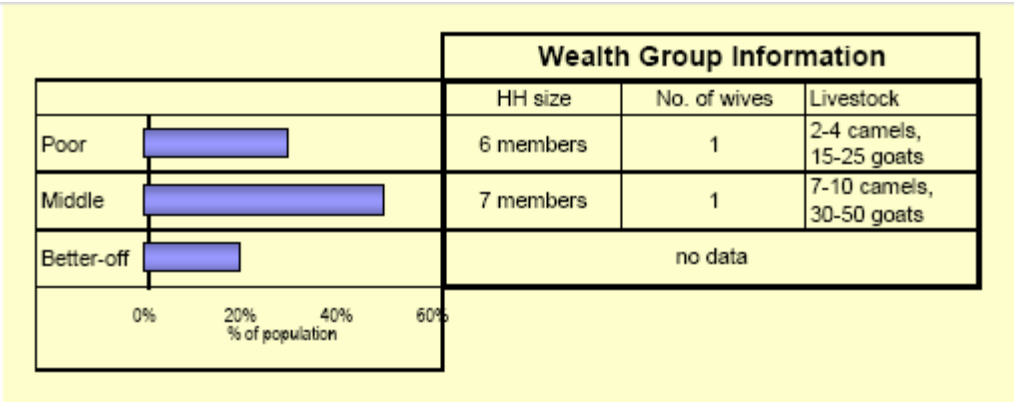
Annex 7: Examples of wealth group information

Djibouti Central Pastoral Highland zone



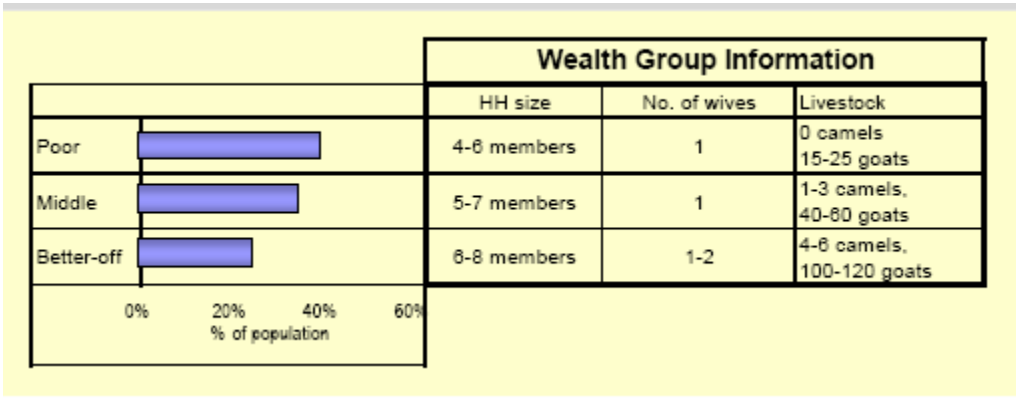
Wealth Group Information		
HH size	Livestock	Main Income Source
6-8 members	0-4 cows, 10-20 goats	Irregular remittance, firewood sales
6-10 members	10-15 cows, 20-30 goats, 0-3 camels	Regular remittance, pension, firewood sales
8-12 members	40-60 cows, 50-100 goats, 5-12 camels	Pension, sale of livestock and sale of butter

Djibouti Southeast pastoral road side zone



Wealth Group Information		
HH size	No. of wives	Livestock
6 members	1	2-4 camels, 15-25 goats
7 members	1	7-10 camels, 30-50 goats
no data		

Djibouti Southeast Border road side zone



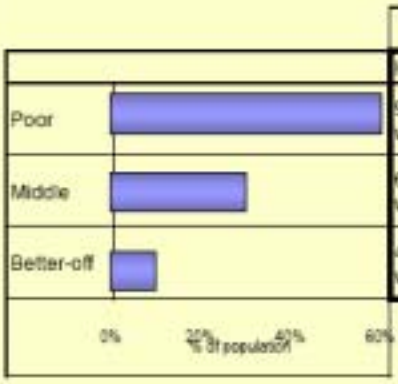
Wealth Group Information		
HH size	No. of wives	Livestock
4-6 members	1	0 camels 15-25 goats
5-7 members	1	1-3 camels, 40-60 goats
6-8 members	1-2	4-6 camels, 100-120 goats

Mauritania Nomadic Pastoral Livelihood

Wealth Group Information		
HH size		Livestock: pastoral HH *
7 members, of whom 4-5 active		3 camels/cattle; 25 sheep/goats; 2 donkey
5 members, of whom 3 active		20 camels/cattle; 100 sheep/goats; 1 donkey
4 members, of whom 1 active		100-1000 camels/cattle; 250+ sheep/ goats; 0 donkeys

* NB. Cattle only in the south

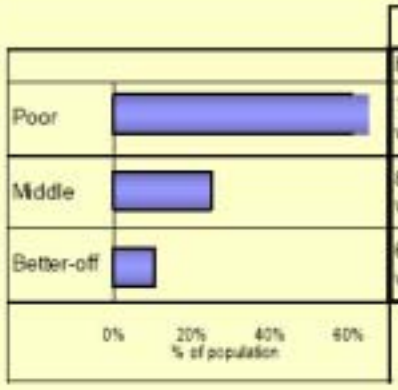
Mauritania Agropastoral



Wealth Group Information

	HH size	Area planted	Livestock
Poor	9 members, of whom 4 active	1 hectare, plus approximately ½ hectare sharecropped	0-3 cattle, 0-1 traction bull, 10 sheep / goats, chickens
Middle	6 members, of whom 3 active	2.5 hectares	5 cattle, 1 pair traction animals, 0-1 camels, 30 sheep / goats, chickens
Better-off	4 members, of whom 2 active	3 hectares	50+ cattle, 2 prs traction animals, 20+ camels, 150+ sheep / goats

Mauritania Pastoralism Mixed with Oasis



Wealth Group Information

	HH size	Date palms: oasis HH	Livestock: pastoral HH *
Poor	10 members, of whom 5 active	10-20 trees / 10-15 kg per tree	0 camels/cattle; 10 sheep/goats; 2 donkey
Middle	8members, of whom 4 active	30-50 trees / 25-30 kg per tree	20 camels/cattle; 50 sheep/goats; 1 donkey
Better-off	6 members, of whom 2 active	100-1000 trees / 50+ kg per tree	50-100 camels/cattle; 200 sheep/ goats; 0 donkeys

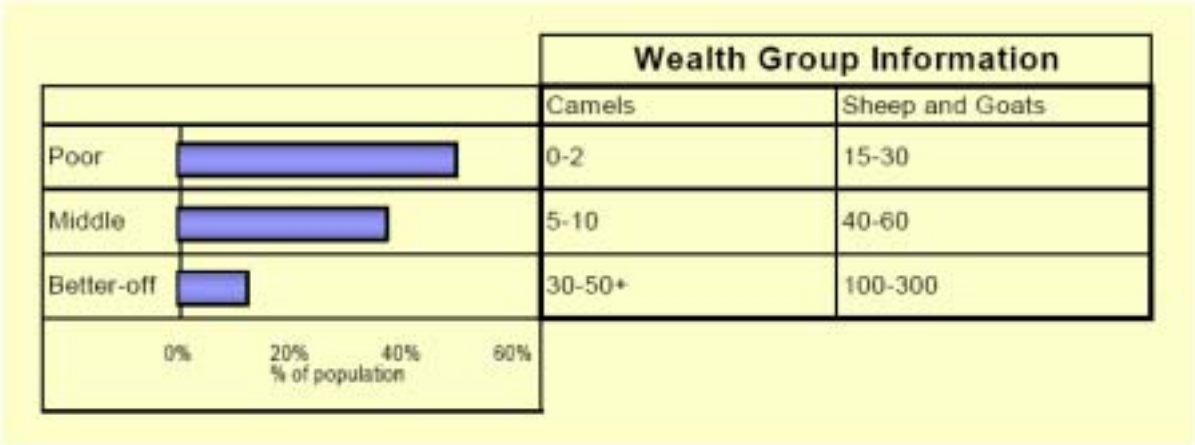
* NB. Cattle herds only in the south

Chad Transhumant Pastoral Livelihood

Wealth Group Information

	HH size	Livestock	Area planted and how
Poor	3-5 members	5-10 cows, 10-25 sheep / goats, chickens	1-2 hectares using household labour
Middle	7-8 members	15-50 cattle, 35-100 sheep / goats, 10-20 camels, chickens	3 hectares using household labour
Better-off	8-13 members	50+ cattle, 100+ sheep / goats, 25+camels, chickens	5 hectares using household labour and employing others

Niger Pastoral Livelihood



Wealth Group Information		
	Camels	Sheep and Goats
Poor	0-2	15-30
Middle	5-10	40-60
Better-off	30-50+	100-300

Source: FEWSnet