

# Natural Resource Management and Biodiversity Conservation in the Drylands of Eastern and Central Africa



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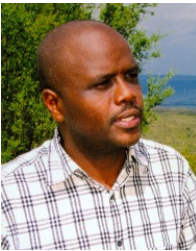
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# CHAPTER 1: Introduction

## 1.1 Study background

Based on the Theory of Change, this study endeavours to provide data on the importance of biodiversity to pastoralism and vice versa, and to provide guidance for policy reforms for sustainable investments which will then contribute to policy dialogue and advocacy and that will lead to changes resulting in more sustainable land use and improved livelihood security. The study is thus predicated on the assertion that “Dryland biodiversity can be conserved by supporting the livelihoods of pastoralists who manage this biodiversity”.

The study was based on five assumptions: **First**, that biodiversity may be best conserved by supporting the livelihoods of the pastoralists who manage this diversity, which in turn was based on an underlying assumption that, while biodiversity can benefit pastoralism and pastoralism can benefit biodiversity, policies may interfere with this mutual relationship for better or worse. Thus, the research called for identification of policies and investment options to achieve sustainability of both livelihoods and management of biodiversity in pastoral areas.

**Second**, that there is inadequate understanding on how policies influence the ability to benefit from the mutual interaction between pastoralism and biodiversity. The study therefore had to provide insight to the policy options, strategies and frameworks for sustainable investment in both pastoralism and biodiversity to improve the welfare of pastoralists and to improve conservation in pastoral areas.

**Third**, that there was need for a trans-regional approach to understanding and influencing dryland conservation and pastoral livelihoods. The rationale behind this is that pastoral systems share many similarities but also reveal considerable variation in biophysical, socioeconomic and policy context. Rather than look for generic solutions to all problems it is necessary to identify commonalities, to explore lessons that emerge from examination of the contextual differences, and to enable decision makers to adapt recommendations to their local situation.

**Fourth**, that a lot of dispersed information already existed on pastoral areas, which can be mobilized for the

purpose of defining policy constraints and identifying solutions. Consequently, the study was seen as an initiative to bring such dispersed information together to provide new insights and generate new understanding.

Thus, the study intended to have convincing material developed so as to achieve policy change and attract investment in the drylands of East Africa. A team of communication experts would prepare communication materials for the presentation in policy dialogue with stakeholders.

A **final** assumption was that a wide range of stakeholders, from local communities to government decision makers, should be engaged in developing these new insights and frameworks to generate new policy dialogue. Engaging different stakeholders is therefore a way of improving both the extent to which policies are likely to be equitable, and of increasing the likelihood that policies will be implemented.

## 1.2 The Study Goal and Objectives

The following study goal and objectives guided the research:

### **Study Goal**

*The primary goal of this research is to make a significant contribution to understanding social and environmental problems and high priority national and regional policy issues and potential reforms that will favour improved and sustainable biodiversity conservation and enhance livelihoods in pastoral areas of the Eastern and Central African region.*

### **Objectives**

*Its objectives are to: (1) inform policy harmonization in sustainable management of dryland and pastoral areas biodiversity; (2) develop tools that will guide sustainable investment options in dryland and pastoral areas; and (3) promote a regional approach to drylands and pastoral areas conservation and use.*

## 1.3 Research Backdrop

It is against the backdrop of a number of challenges and opportunities relating to the natural resources management and biodiversity conservation in the drylands that warranted and justified the undertaking

of the study. Amongst these are issues and topics on: Drylands and pastoralism; Pastoralism, natural resources and adaptation; Pastoral livelihoods, adaptation and diversification; Biodiversity and the provision of dryland Services; Pastoral vulnerability; Poverty and land degradation in drylands; Pastoral policy; and Pastoral myths, misconceptions, and environmental degradation.

These are discussed.

### 1.3.1 Drylands and pastoralism

Drylands cover approximately 41.5% of the world's land surface and are home to more than 32 percent of the world's population, including numerous mega-cities (Safriel and Adeel 2005). In Eastern and Central Africa, data is incomplete, but using data from FAO ([www.fao.org/corp/statistics](http://www.fao.org/corp/statistics)), it is estimated that drylands cover approximately 75% of the region, and have a total population of significantly more than 100 million.

Drylands are areas with a mean annual potential evapotranspiration at least 1.5 times greater than mean annual precipitation (Middleton and Thomas 1997). Dividing precipitation by potential evapotranspiration gives an aridity index, and based on this index, drylands are categorized into four sub-types: dry sub-humid (AI 0.65-0.5), semi-arid (AI 0.5-0.2), arid (AI 0.2-0.05), and hyper-arid (deserts – AI <0.05). This definition and classification has been adopted by UNCBD, IUCN and the UNCCD, although the UNCCD excludes hyper-arid lands from their classification for practical reasons.

Dryland ecosystems are characterized by a low level of precipitation and a high degree of uncertainty over when and where it falls. Highly uncertain primary productivity is found in rangelands with a coefficient of variation of annual rainfall exceeding 33%: in Eastern Africa this may include areas with more than 1000mm rainfall per year (Ellis 1995). This unpredictability leads to uncertainty in biomass production and also contributes to ecological flux. The combination of uncertain precipitation, fire and herbivore activity can cause dryland ecosystems to transition between steady states, remain in a given condition until a new shock drives transition to another steady state (Behnke *et al.*, 1993, Vetter, 2005). Ecological flux poses a challenge to understanding rangeland condition and ecosystem health in the drylands and is at the root of much of the uncertainty surrounding the extent of desertification and the effectiveness of efforts to combat it.

Broadly defined, pastoralism is: “extensive livestock production in the arid and semi-arid rangelands” An elaborated definition is that pastoralism is: “herding

and subsisting primarily on livestock (and other domesticated animals) and their products, with the animals herded on natural, free range, extensive enough to offer the possibility of movement, and the herders having strong sociological attachment to their animals, usually in harsh (hot and cold) ecology” (Aboud *et al.*, 1997).

Commonly, pastoralism is defined as a production system in which 50 per cent of the gross household revenue (i.e. the total value of marketed production plus the estimated value of subsistence production consumed within the household) comes from livestock or livestock related activities (Morton & Meadows 2000: 6). Two related terminologies are: pure pastoralism and agro-pastoralism. According to Dietz and Salih (1997) *pure pastoralism* is a livelihood whereby people solely live from what their animals provide them. It is suggested that such system hardly exists and the term *pure pastoralism* is thus used, for instance by Rutten (1992: 13) to refer to a production system in which most of the pastoralists' income is based on the livestock enterprise. On the other hand, if pastoralists obtain 10 to 50 per cent of their income from animals and the rest from agriculture they are classified as '*agro-pastoral*'.

Pastoralism is practiced on 25 percent of the world's land area, provides 10 percent of global meat production, and supports an estimated 200 million pastoral households and herds of nearly a billion camelids, cattle and smaller livestock, in addition to yaks, horses [and] reindeer (FAO 2001).

### 1.3.2 Pastoralism, natural resources and adaptation

Other definitions relate to the natural resource base in the production system. According to Dietz (1987) pastoralism is a livestock-based or a pasture-based economy, in which livestock directly or indirectly provides more than half of the food needs of households.

If livestock products directly provide more than half of the food needs, we may call the economy “subsistence pastoralism”. If livestock products are sold or bartered and food is bought with the proceeds, the economy may be called “commercial pastoralism”. If less than half of the food needs are covered by direct or indirect livestock products, but livestock is part of the economy, we may call the economy “agro-pastoral”. If livestock is used for manure and draught power, and if fodder is produced to feed the animals, we may call the economy “mixed-farming” (Dietz, 1987). In this

respect, Rutten (1992) suggests that “pastoralists are people who make a living by keeping livestock that act as a direct intermediate between man and his natural environment; the pastures”.

Pastoralism in eastern and central Africa is highly adapted to the environmental variability of dryland ecosystems and many of the adaptive mechanisms used by pastoralists to manage the risks and vulnerability of life in drylands have been documented by ethnographers (Spencer 1973, Dyson-Hudson 1966, Bovin and Manger 1990). Pastoralism has been described as an adaptation to uncertainty and many of the challenges that face pastoralists and pastoral lands can be traced back to changes to pastoral management and social systems that have eroded their adaptive capacities. Sustainable pastoral development therefore hinges on understanding and strengthening pastoral adaptive capacities (Davies and Nori, 2008; Davies *et al.*, 2010).

Roe *et al.*, (1998) suggest that the literature on pastoralism is sufficiently rich to accommodate two very different models of pastoralism. Currently, virtually all attention given to pastoralism focuses on herder risk aversion, ecological adaptation and the need for herd mobility in the face of an unpredictable environment. In contrast to the model of risk-averse pastoralism, the disequilibrium-based models of ecological dynamics on rangelands, often referred to as the “new range ecology,” enable us to see pastoralism as a *high reliability institution*. From this perspective, high reliability pastoralism is the search and attainment of reliable peak performance through utilizing and managing highly complex technologies. “Reliability” seeking will go a long way in demystifying the various myths and misconceptions about pastoralism and pastoral economies.

### 1.3.3 Pastoral livelihoods, adaptation and diversification

The three major dryland livelihoods, pastoral, farming, and “alternatives”, are interlinked and characterized by tradeoffs and synergies. Historically, dryland livelihoods have been based on a flexible combination of hunting, gathering, cropping, animal husbandry, and fishing. Archeological records and anthropological studies have revealed shifts in livelihood strategies over time in the same location and often involving the same cultures. As a consequence, land use has changed both in time and space as an adaptation to new economic possibilities, in response to environmental or climatic changes, or as a result of war or drought-induced migration. Land

use changes are thus both responses to changes in the provision of ecosystem goods and services and drivers of changes in this provision.

There is in existence diverse options open to people from pastoral backgrounds for improving their livelihoods. These options may include livestock marketing, arable farming and restocking, petty trade, sale of livestock produce and natural products such as firewood, charcoal, poles, grass for fodder and wage employment outside or complementary to the mainstream of the pastoral lifestyle (Homewood *et al.*, 2009).

The adaptive capacity of pastoralists is often cited as the reason why they have been able to construct resilient livelihoods in the drylands for many centuries, yet this appears to fly in the face of our current experience of pastoralists regularly facing food insecurity and poverty. Adaptation in the pastoral context usually refers to the capacity to adapt to changing climate, to variability in resource availability, to adapt to other stressors such as conflict or disease, and to adapt to new markets or new resources. However, it is evident that pastoralists are facing many challenges in adapting to the changes that they currently face.

Part of the challenge may be the unprecedented magnitude and rate of the current changes, whether climate change, democratisation, or globalisation. Another cause may be that pastoralists have had their adaptive capacities eroded through inappropriate development, for example through loss of resources or weakening of governance systems (Davies and Nori, 2008).

An important adaptation for pastoralists now is to diversify their livelihood, and there are a growing number of opportunities as pastoralists integrate into the wider national and global economy. However, diversification *per se* is not a guarantee of sustainable development in the drylands and there are potential costs to pastoralists: it is important to differentiate between alternative and complementary livelihoods. Alternative livelihoods can compete with pastoralism over resources such as land and labour and pastoralists have to make a decision over how resources will be allocated. For example, a pastoral household may have educated members who are employed outside the rangelands, which presents a supplementary and stable income at certain times of year, but represents a labour cost to the system. Some alternative livelihoods impose a cost on pastoralists over which they have no decision, for example when former pastoralists cultivate rangelands and thereby remove grazing lands from the pastoral system (Davies, 2009).

Complementary livelihoods imply that the livelihood does not directly compete with pastoralism but augments pastoral production. For example, pastoralists may engage in processing of dairy products (e.g. to make butter or cheese) in order to improve the value and marketability of their primary produce, or they may begin marketing some of the natural products (e.g. medicinal plants, natural cosmetics) that they traditionally use. In fact, the distinction between complementary and alternative livelihoods cannot be clearly defined and some alternative livelihoods can be highly complementary, even though imposing a small cost on pastoralism. An example is ecotourism, where communities set aside a piece of land for conservation and attract tourist investors. The income for the community can be sizeable, whereas the cost to livestock production can be kept to a minimum. This sort of experience is particularly common in Kenya.

Diversification has important consequences for pastoral mobility, particularly when labour is diverted from the pastoral production system. Herding livestock can be labour intensive and can be compromised where labour is in short supply, which may act as a deterrent to diversifying livelihoods at the household level. In some parts of the world, diversification of labour leads to splitting of the household, for example with men tending the cattle whilst women engage in agriculture (e.g. Karamoja). This has implications for control over income and assets from livestock as well as for the way natural resources are managed (Homewood *et al.*, 2009).

### 1.3.4 Biodiversity and the Provision of Dryland Services

#### Biodiversity

Depending on the level of aridity, dryland biodiversity is relatively rich, still relatively secure, and is critical for the provision of dryland services.

Of 25 global “biodiversity hotspots” identified by Conservation International, 8 are in drylands. The proportion of drylands designated as protected areas is close to the global average (Bonkougou and Niamir-Fuller, 2001), but the proportion of dryland threatened species is lower than average. At least 30% of the world’s cultivated plants originated in drylands and have progenitors and relatives in these areas. A high species diversity of large mammals in semiarid drylands supports cultural services (mainly tourism); a high functional diversity of invertebrate decomposers in arid drylands supports nutrient cycling by processing most arid primary production; a high structural diversity of plant cover (including microphyte diversity of

soilcrusts in arid and semiarid areas) contributes to rainfall water regulation and soil conservation, hence to primary production and its generated diversity of the dryland wild and cultivated plants.

#### Ecosystem Services

Ecosystem services are categorized into supporting, provisioning, regulating, and cultural services.

**Supporting Services:** These include: Soil Development (Formation and Conservation, Nutrient Cycling, and Primary Production).

**Provisioning Services:** These include: Provisions Derived from Biological Production (Food and fiber, Woodfuel, Biochemicals); Freshwater Provisioning.

**Regulating Services:** These include: Water Regulation; Climate Regulation; and Pollination and Seed Dispersal.

**Cultural Services:** These include: Cultural Identity and Diversity; Cultural Landscapes and Heritage Values; Servicing Knowledge Systems; Spiritual Services; Aesthetic and Inspirational Services; and Recreation and Tourism.

#### The Provision of Dryland Services

Contrary to expectation, there is greater declines in species diversity in non-dryland temperate humid areas than in drylands.

#### Deserts

Some 7,000 terrestrial amphibian, reptile, bird, and mammal species live in the desert biome. This covers 25% of global terrestrial fauna of these groups—22% of which also live in other biomes and 3% are found exclusively in deserts.

#### Grasslands

Grasslands (the temperate grasslands, savannas, and shrub-land biome and the tropical and sub-tropical grasslands, savannas, and shrub-land biome) occur in the semiarid and the dry sub-humid dryland subtypes, and their biodiversity is richer than that of deserts (12% and 28% respectively of the global terrestrial vertebrate fauna are found in these two biomes).

#### Mediterranean forests, woodlands, and shrub-lands biome

The Mediterranean biome, comprising xeric woodlands and shrub-lands, occurs within semiarid and dry sub-humid areas with a Mediterranean climate and is subjected to intensive human impact, especially in the

Mediterranean basin, resulting in plant adaptations to clearing, grazing, fires, and drought (Davis *et al.*, 1996). Species richness is high (Mooney *et al.*, 2001), with the Mediterranean basin supporting 25,000 vascular plants (10% of global species), of which 60% are endemic; 10% of the global vertebrates species inhabit the Mediterranean biome.

### 1.3.5 Pastoral vulnerability

Omondi *et al.*, 2009 suggest that food and Livelihood crises in pastoral areas have been raising concern at national and international development arena. A mixture of livelihood shocks ranging from natural forces such as droughts, floods and diseases to man made forces such as constraining policy environment like the ban on meat export to the gulf region, privatization of common property resources and control of stock numbers as well as limiting livestock movements have interacted to compromise pastoral livelihood. The increasing vulnerability has led to the questioning of the viability of pastoralism.

Diverse views have therefore been expressed with regard to pastoralism and their increasing vulnerability. Some scholars have explained the current state of pastoral livelihoods from the Malthusian perspective, submitting that there has been population explosion in pastoral areas. The growth in livestock herds has not matched human growth due to reduction of land available thus greatly reducing livestock- human ratio to the level that the livestock population cannot support the human population beyond the poverty threshold.

Climate change has also been propagated as the cause of the current vulnerability. It is said that with droughts becoming frequent and unpredictable, rains coming short but with great intensity, the pastoral traditional knowledge of predicting droughts and rains has been seriously challenged thus with the result that when these events occur, pastoralists are caught unprepared and hence unable to cope.

### 1.3.6 Poverty and Land Degradation in Drylands

The poor in ecologically fragile marginal lands are locked into patterns of natural resource degradation. Six million ha of productive land are lost every year, threatening the livelihoods of perhaps a billion people. Land degradation could compel as many as 135 million people in 110 countries possessing a potential risk, to join the ranks of 'environmental refugees'. According to the United Nations Environment Programme (UNEP), USD 42 billion is lost each year to desertification globally. The indirect economic and social costs

suffered outside the affected areas, in terms of the decline in national food production and the influx of environmental refugees, may be much greater.

With over 40% of the population residing in degraded lands, amounting to some 200 million people, and the majority eking out their livelihoods from subsistence agriculture and pastoralism, desertification impact is nowhere more striking than in Africa. In sub-Saharan Africa, 'low potential' areas are home to some 103.1 million rural poor, while 'high-potential' areas contain 169.8 million rural poor.

Most of East Africa's land mass falls in the arid and semi-arid lands (ASAL) where pastoralism based on extensive livestock production serves as the bedrock of livelihoods and culture. The ASAL regions are among the region's poorest, where weak infrastructure, widespread insecurity, frequent droughts and limited livelihood options keep many residents in conditions of poverty and vulnerability. Recurring shocks and an influx of refugees from conflict zones in various countries have created pockets of protracted relief operations that raise concerns about dependency on external assistance. Nonetheless, because population densities in the ASAL are low, central governments, donors and non-governmental organizations (NGOs) pay relatively little attention to the particular challenges that confront residents of the ASAL regions and thus to policies necessary to sustain and improve their livelihoods.

By World Bank (World Bank Institute, 2005) definition, poverty is "pronounced deprivation in well-being". The conventional view links well-being primarily to command over commodities, so the poor are those who do not have enough income or consumption to put them above some adequate minimum threshold. This view sees poverty largely in monetary terms.

The broadest approach to well-being (and poverty) focuses on the .capability. of the individual to function in society. The poor lack key capabilities, and may have inadequate income or education, or be in poor health, or feel powerless, or lack political freedoms (World Bank Institute, 2005:10).

### 1.3.7 Pastoral policy

Omondi and Odhiambo (2009) suggest that while the explanations of the challenges facing pastoralism are valid to a point, they fail to appreciate that the main reason for increasing vulnerability of pastoral livelihoods is the persistent cycle of inappropriate policy and practice in eastern Africa. After decades of experimentation with inappropriate policies; policies that are neither consistent with the needs nor responsive to

the uniqueness of the pastoral system, the impacts are now being manifested in increasing vulnerability fueled by pastoralists' inability to manage risks and to cope with the manifold challenges that characterize the drylands.

Governments in the Horn and East Africa have historically neglected pastoralism. Both during the colonial and post-colonial eras, the attitude of governments towards pastoralism has ranged from outright hostility to benign neglect. When governments have intervened in pastoral areas, the result has been failed projects informed by imperatives that are totally inconsistent with the reality of the drylands (Davies *et al.*, 2010). Policy, legal and institutional interventions have undermined the authority and effectiveness of traditional pastoral institutions and values, which are the repository of indigenous knowledge that pastoralists have used for millennia to manage risks and cope with livelihood shocks.

The overall result of this cycle of inappropriate policies has been the stagnation of development in pastoral areas. In any case, both governments and donors have deliberately sought to focus development support in the so-called 'high potential' areas deemed to guarantee the highest returns on such investments. Pastoral areas have been characterized as "hardship areas" and have continued to lag behind the rest of the countries in terms of communications infrastructure, social services and economic investments (Omondi and Odhiambo, 2009).

Government and donor preoccupation with drought management, relief, and humanitarian aid to the pastoral communities has diverted attention from the need to invest and develop pastoral areas, while also creating a dependency syndrome among members of pastoral communities. In fact, it is not possible for pastoralists to effectively manage droughts if they are unable to spread and manage the risks inherent in their drylands environment. Traditional practices such as mobility are critical means and strategies of spreading risks among pastoral communities. Yet these are the practices that have been undermined by government and donor interventions (Omondi and Odhiambo, 2009).

In order to secure pastoral livelihoods and open up pathways for sustainable economic development in pastoral areas, it is imperative that drought management, relief and humanitarian assistance be combined with interventions aimed at enhancing opportunities for economic production and for integrating pastoral economies into national economies. Appropriate policies for pastoral areas must incorporate the need to address the unique challenges of these regions with the provision of resources and incentives for upward economic mobility

for individual pastoralists (Omondi and Odhiambo, 2009). The authors add that there is need to address increasing pastoral vulnerability at two levels, namely i) managing risks by spreading it and ii) increasing livelihood options as a way of increasing peoples abilities to cope with crises. In this connection, policy and practice change is necessary in terms of:

1. Increased investment in infrastructure development within pastoral areas to create and secure vibrant pastoral economy with opportunities for diversification of and alternative livelihoods.
2. Development of a holistic and conducive policy framework with incentives for private sector investment and integrated development of pastoral areas and pastoralism
3. Increased investment in universal education in pastoral areas to create a well trained human resource that can compete for opportunities with other people in the global market and to complement pastoralism.

### **1.3.8 Pastoral myths, misconceptions, and environmental degradation**

There has been a tendency in the past to equate pastoralism with environmental degradation, and government policy in Eastern and Central Africa has frequently been driven by the assumption that *pastoral rangelands are unmanaged and therefore over-exploited*, as theorized by Hardin (1968).

Another common myth and misconception is that *pastoralism lacks rationality* and that pastoral economies are not managed by objectives and designs, rather they are based on crisis and chaos, and that pastoral economies lack economic potential and prospects for the pastoral lands and peoples therein. Thus, pastoralism is blamed for environmental degradation and loss of biodiversity.

The new understanding of rangeland dynamics refutes some of these assumptions, and there is a growing realization that, despite many constraints to their rangeland management practices, where pastoralists are still able to move their herds effectively, and where their traditional systems of governance remain strong, rangelands tend to be in good condition (Niamir-Fuller 1999).

Empirical evidence generated from this study tend to challenge the misconceptions, with that the collected data suggesting that with supportive national and regional policy, potential reforms and investments, pastoralism will ensure improved and sustainable biodiversity conservation, which in turn will enhance livelihoods in pastoral areas, and vice versa.



The myth “Pastoralists contribute little to national economic activity.” can and is easily demolished by looking at the statistics. The economic contribution of extensive nomadic pastoral livelihood systems to GDP and exports is high, and is at least partially captured by national economic statistics. For example, in Mongolia pastoral livestock are responsible for one third of GDP and are the second largest source of export earnings (32 percent) after minerals (41 percent). In Ethiopia, the livestock sector (of which nomadic pastoral production is a key component) is 12 to 16 percent of GDP, one third of agricultural GDP and 8 percent of export earnings. The conclusion is that in the drylands, pastoral livelihoods make a major contribution to national economic activity, although often these contributions are not documented properly (Swift, 2003).

The assertion that “*Pastoralism has very low productivity. Sedentary cattle raising is more productive than mobile systems.*” is yet another misconception. Research shows that mobile pastoral systems have higher economic returns per hectare than ranching systems under similar conditions. The difference ranges from two or three times higher to ten times higher. Productivity per unit of labour and per animal is generally lower, although in Uganda, economic returns per animal in a pastoral setting were one third higher than in local ranches. Mobile cattle raising has also been shown to be more productive than sedentary husbandry under the same environmental conditions. In the Sahelian droughts of the 1980s, herders who moved their cattle long distances

to find pasture fared much better than those who stayed. In Sudan and Mali, sedentary cattle producers have lower productivity than the nomads (Swift, 2003).

A series of studies in the 1970s and 1980s, summarized in the table below, showed that traditional pastoral systems in Africa can perform better than sedentary ranching systems in productive terms by anything from 2 to 10 times (Scoones 1995).

This finding turns on its head the notion that sedentary livestock production should replace pastoralism. However, the reasons behind the greater performance of pastoralism should be scrutinized. Ranching models provide higher capital returns and usually provide a narrow range of products that are more carefully tailored to market requirements. In this respect, pastoralism has traditionally been unattractive to investors.

The advantage of pastoralism is that it exploits a wider range of ecological niches across a wider landscape than imported livestock models; pastoral systems remain productive through more severe climatic events than ranching models; pastoral livestock recover faster from droughts, putting on body weight and becoming fertile very quickly; and pastoralists produce a wide range of products, many of which are consumed within the household, and which capitalise on the diversity of rangeland environments.

**Table 1.1. Comparative in profitability between pastoralism and ranching systems. Reproduced from Scoones (1995)**

Country	Comments
Zimbabwe	All studies show that the value of communal area (CA) cattle production far exceeds returns from ranching. If actual stocking rates are used, CA returns are ten times higher per hectare.
Botswana	Communal area production (in cash, energy and protein terms) per hectare exceeds by at least three times per hectare returns from ranches, even though technical production parameters are lower. The difference in soil erosion levels between the two production systems is negligible, despite differences in stocking rate.
Mozambique	Traditional systems have higher overall returns per hectare because of the multiple benefits of draft, transport, manure, milk and meat compared to the single beef output from ranches.
South Africa	Cattle production systems in the Transkei show higher returns per hectare, but lower productivity indicators, compared to ranches in the commercial white farming sector.
Tanzania	The productivity of pastoral herds in the Ngorongoro Conservation Area was found to be comparable to commercial herds. Maasai multi-product outputs are higher than ranches on a per hectare basis.
Uganda	Recalculations of figures to include full range of costs and benefits show that dollar returns per hectare under pastoralism are two times higher than for ranching. Dollar returns per animal are a third higher.
Ethiopia	The pastoral Borana system has higher returns of both energy and protein per hectare compared to industrialised ranching systems in Australia. Australian Northern Territory ranches only realise 16% of the energy and 30% of the protein per hectare compared to the Borana system.
Mali	Transhumant pastoral systems yield on average at least two times the amount of protein per hectare per year compared to both sedentary agro-pastoralists and ranchers in the US and Australia.

## 1.4 Methodological Approach

The methodology took a four-stage procedure, including:

### 1.4.1 Mapping and spatial analysis of pastoral biodiversity interaction

This involved a regional analysis in which the study focused on pastoral livelihoods and biodiversity in areas under pastoral land use in northern Tanzania, southern and northern Kenya and southern Ethiopia. A series of digital maps were developed showing the current and projected state of the environment in this region. The analysis relied on spatial data, currently available with the partners cooperating in this project, and other publicly available sources.

This methodological procedure involved the characterization of the drylands through spatial analysis of rainfall and evapo-transpiration, and zoning of the eastern Africa region into 4 zones, namely the dry sub-humid, semi-arid, arid and hyper arid. The areas under each zone were then calculated for the regional analysis for the three countries.

Mapping was then done for forage and forage deviation for the period 2003 to 2010, and for human and livestock population distribution across the 3 countries, deriving statistics for each of these countries on human population and its growth from 1960 to 2009 and projected to 2025.

Also mapped were the areas under agriculture and areas infested by tsetse, and biodiversity (Figure 2.9), picking examples of species richness of mammals and ungulates in eastern Africa and classifying the threats for each of these species.

Highlighted was the importance of open areas and mobility, livestock interaction with wildlife and how communities have played a role in biodiversity conservation. Statistics of the contribution of livestock and wildlife to the economies of the country and the region were derived. Highlighted also was the fact that the areas under protected areas, agriculture and the areas infested by tsetse have variable rainfall and so necessitate mobility.

The maps and statistics generated in this chapter were used in coming up with key recommendations, defining the policies and testing the policies rationale of the earlier dryland policies.

Three case studies were undertaken in the mapping and spatial analysis method. The first focused on human and livestock dynamics in Kenya and Ethiopia, and infrastructure facilities to support the livestock development. The second addressed payment for environmental service in the Maasai Mara area, and the third case study looked at scenario of land cover and land use change in Tarangire-Simanjro, Ecosystem in Tanzania.

### 1.4.2 Valuation of current and potential land use

This involved measuring Total Economic Value (TEV) in pastoral systems, and up-scaling of potential for investment opportunities.

The methodology entailed rapid assessment of both primary collection and secondary sources, extensive review of literature, key informant interview and consultation with resource managers, valuations through market pricing, travel cost, contingent valuation, and benefit transfers, and the cross cutting approach is to assess the TEV of dryland goods and services.

Data collection was through identification of important land uses and sets of values from dryland goods and services based on literature and on brief field surveys. Detailed data on some use values were derived, but it was not possible to collect time series data for goods and services whose market value is non-existent. Consequently, much of the data used in the case studies (in four study zones, namely the Mara area in North Tanzania, the Mara swamp in South Narok district, the lower Ewaso Nyiro in Isiolo/GarbaTula area in Kenya and Did Tuyura area in South Ethiopia) are based on secondary data from government ministries, local NGOs and other local enterprises in which the case study area is located. The research faced several problems with the secondary data. Some data are fairly recent but it was often necessary to rely on old datasets. The recorded values of some key dryland goods and services appear to have been underestimated and their use therefore has to be made with caution.

### 1.4.3 Policy Change analysis

The methodology involved in the study of policy involved an extensive review of both black and grey literature on policy and institutional frameworks in the three countries. Literature review was reinforced and complemented with an in-depth policy analysis guided by the research project's objectives.

*This involved determination of the views of policy; policy processes; getting buy-in to the policy process; and applied the theory of change.*

#### **1.4.4 Communication and dissemination**

Key targets for communication of this project outputs were analysed as part of the research and the communication strategy was tailored accordingly. The research identified policies that are impacting on pastoral livelihoods and biodiversity, and relevant policy options were developed for the relevant Ministries. Policy bottlenecks were identified, such as funding or capacity constraints at local government level, and communication was targeted accordingly.

In more general terms, the project will developed communications in four areas, namely: communication to other researchers; communication to policy/decision makers; communication with local communities/ stakeholders; and communication to the general public.

Communication activities targeted at policy makers will be developed and implemented in phase 2 of this project, following development of chapter seven, where the key findings and recommendations will be described.

## **1.5 Report Outline**

**Chapter 2** (Study Areas and Methodological Approach) describes the study areas and sites and the methodological approaches used in the research, which took a four-stage procedure, including: mapping and spatial analysis of pastoral biodiversity interaction; valuation of current and potential land uses; policy change analysis; and developing communication and dissemination tools.

Thus the chapter discusses the application of a trans-regional approach to the study, the mobilization through desk search and review of dispersed ecological and socioeconomic information that is already in existence on dry land areas as secondary data, and the collection of primary data through sociological surveys, Focus Group Discussions and Key Informant techniques which was used in Case Studies.

**Chapter 2** (Regional Analysis of Natural Resources and Social Indicators) presents the mapping and spatial analysis of pastoral biodiversity interactions, that include an analysis of available, mostly spatial, information to describe the status of pastoral physical environment,

the drivers and pressures on the natural resources, the ecosystem services therein, and reveal how these conditions and services have changed over time, and how the changes in these drivers and pressures relate to socio-economic and biodiversity indicators.

**Chapter 3** (Valuation of Land Use Options in Selected Dryland Sites in Eastern and Central Africa: case studies from Tanzania, Kenya and Ethiopia) estimates the Total Economic Value (TEV) of ecosystem goods and services in four study zones, namely the Mara area in North Tanzania, the Mara swamp in South Narok district, the lower Ewaso Nyiro in Isiolo/GarbaTula area in Kenya and Did Tuyura area in South Ethiopia. The chapter also investigates the shift in TEV with land use change, and shows how valuation techniques can shed light on trade-offs between competing land uses.

The chapter first discusses the economics of pastoralism, the ecosystem services, and the measurement of the values of pastoralism, including the direct, the indirect, the existence and the option values. It then presents the valuing system components and an overview of approaches and valuation methods used in the case studies in the four study zones. The chapter finally presents the findings based on the case studies categorised under the Mara River Basin and Ewaso Nyiro River Basin both in Kenya.

**Chapter 4** (Dryland Development Options) presents a classification of the drylands of the Eastern Africa region into so-called dryland development domains, which are geographical units with similar development constraints and opportunities, based on spatial information on (i) aridity/agricultural potential, (ii) market access and (iii) human population density. A map showing these eight development domains provides a framework for targeting interventions and alternative land use and livelihood options. The chapter reviews a number of these potential livelihood strategies, presents constraints and trade-offs and assesses some of the criteria influencing their successful implementation.

**Chapter 5** (Policies and Policy Change) presents a simplified summary of the analysis of some of the extant policies at global, regional and national levels in the Eastern Africa with a bearing on pastoral livelihoods and its interaction with biodiversity conservation and dryland development. From this analysis, attempt is made to look at the impact of the policies and laws on the interaction between pastoralism, biodiversity conservation and drylands development.

Consequent to the impact analysis, attempt is made to generate policy options that will ensure and secure positive interaction between pastoralism, biodiversity conservation and drylands development. In the policy review, impact analysis and the generation of policy options, special attention has been given to the role of traditional knowledge in terms of integration and how it can be used to enhance biodiversity conservation and accelerate development in the drylands.

The final **Chapter 6** (Key Findings and Recommendations) then presents the key findings of the study as derived from chapters two to five, and presents the recommendations that have been developed and discussed, in consultation with the national stakeholders in Kenya, Ethiopia and Tanzania, in the dialogue meetings.

# Chapter 2: Regional Analysis of Natural Resource and Social Indicators

## 2.1 Status of the Physical Environment

Drylands cover about 41% of Earth's land surface and are inhabited by more than 2 billion people (about one third of the world population; IFAD 2000, MA 2005). Drylands are limited by soil moisture, the result of low rainfall and high evapotranspiration and show a gradient of increasing primary productivity, ranging from hyper-arid, arid and semi-arid to dry sub-humid areas (MA 2005; IFAD 2000). Deserts, grasslands and woodland are natural expression of this gradient (MA 2005).

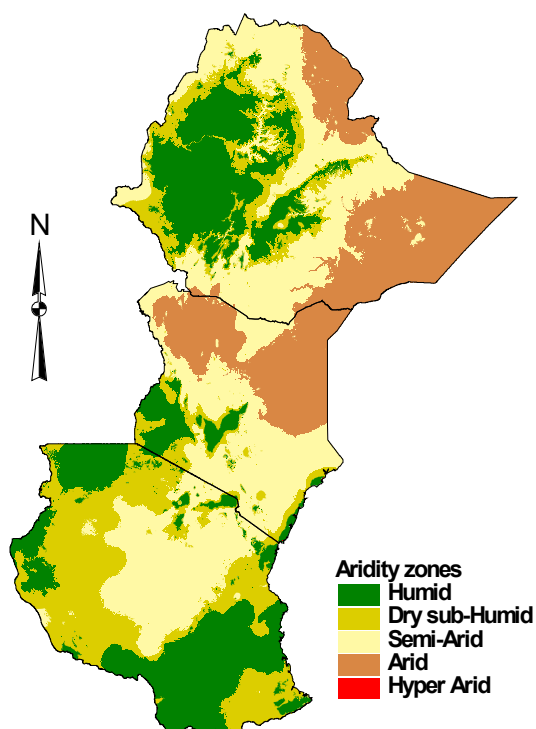
Drylands occupy 70% of the Horn of Africa – ranging from 95% in Somalia, 90% in Kenya, 75% of Ethiopia and 67% of Tanzania (Nassef *et al.*, 2009, this study). These drylands are productive and contribute to national economies and to society (Nassef *et al.*, 2009). They support agriculture, livestock rearing, tourism and wild resource harvesting, and play a critical role in ensuring national food sufficiency (Nassef *et al.*, 2009).

The main production system in the drylands of East Africa is livestock and wildlife conservation. In Ethiopia eleven million of the 35m cattle are kept by pastoralists in the drylands (Simpkin, 2005). Of Ethiopia's 42m sheep and goats, 18m are kept by pastoralists (Simpkin, 2005). In Kenya, over 75% of the cattle herd is made up of indigenous breeds, and more than 80% of the livestock are traditionally kept by pastoralists in the drylands (Nassef *et al.*, 2009, FAO 2007 and this study). Cattle herds in Tanzania are almost entirely made up of indigenous breeds (over 95%), indicating that the bulk of the nations' animal wealth is in dryland areas (Hesse and MacGregor, 2006; Nassef *et al.*, 2009). More than 80% of the livestock population is found in the Tanzanian drylands (FAO 2007 and this study). The study by Kirkbride and Grahn (2008) indicates that the bulk of the meat, milk and other livestock products consumed in the Horn of Africa region comes from the drylands.

Drylands, as defined by the United Nations Convention to Combat Desertification (UNCCD) comprise land within the arid, semi-arid and dry sub-humid aridity zones (UNEP 1997)<sup>1</sup>. Drylands are characterized by low, erratic and highly inconsistent rainfall levels and high coefficient of rainfall (IFAD 2000, Jones & Thornton 2003). The main characteristic of dryness is the negative balance between annual rainfall and evapotranspiration rates and poor soils and water resources. The aridity zones are delineated based on an Aridity Index, which is determined by the ratio of

**Table 2.1: Characteristics of drylands**

Dryland zone	P/PET ratio	LGP (days)
Arid	0.03 - 0.2	1-74
Semi-arid	0.2 – 0.5	75-119
Dry sub-humid	0.5 -0.65	120-180



**Figure 2.1: Spatial distribution of drylands in Ethiopia, Kenya and Tanzania**

<sup>1</sup> Hyper-arid areas are excluded in the UNCCD definition for practical purposes, as drylands are considered as areas endangered by desertification and hyper-arid areas are considered deserts.

**Table 2.2: Summary of land area covered by dryland**

Country		Humid	Dry sub-Humid	Semi arid	Arid	Hyper Arid	Total Dryland
Kenya	Area (km <sup>2</sup> )	58,580	48,098	256,256	221,761	39	526,115
	%	10.0	8.2	43.8	37.9	0.01	90%
Ethiopia	Area (km <sup>2</sup> )	288,812	146,933	385,931	307,706	0	840,570
	%	25.6	13.0	34.2	27.3	0.00	74%
Tanzania	Area (km <sup>2</sup> )	309,407	374,077	257,725	0	14	631,802
	%	32.9	39.7	27.4	0.00	0.01	67%
Total	Area (km <sup>2</sup> )	656,799	569,108	899,912	529,467	53	1,998,487
	%	24.7	21.4	33.9	19.9	0.01	70%

the precipitation (P) to the potential evapotranspiration (PET). Table 2.1 shows the correlation of the CCD Dryland zone nomenclature with the FAO length of growing period (LGP).

The aridity map was derived from global aridity datasets generated by Trabucco and Zomer (2009). The data was downloaded from the CGIARCSI GeoPortal (<http://www.csi.cgiar.org>). Figure 2.1 maps the spatial distribution of the Aridity zones in Eastern Africa.

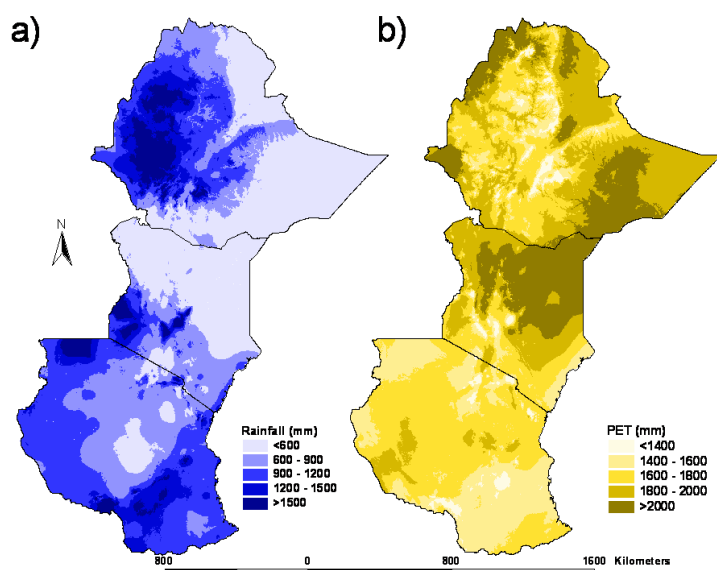
In total, the drylands cover 2 million km<sup>2</sup> or 75% of the total land area. The arid zone is mainly found in Kenya and Ethiopia. The area coverage is about 530,000 km<sup>2</sup> or 20% of the total area. The semi-arid zone covers mainly the central parts of Ethiopia, northern and southern Kenya and northern and central Tanzania covering an area of about 890,000 km<sup>2</sup> (34%). The dry sub-humid zone is found on the edges of the central highlands of Ethiopia, the coastal, central and western edges of high rainfall areas in Kenya, the western and south eastern sections in Tanzania. The dry sub-humid covers an area of 569,000 km<sup>2</sup> or 21% of the total area.

Figure 2.2 shows the spatial distribution of rainfall and evapotranspiration. Rainfall in Eastern Africa ranges from very low less than 300 mm to very high rainfall areas of more than 1500mm of rainfall per year. Areas of less than 600 mm of rainfall, rains are scarce and unreliable, with high coefficient variation of rainfall (IFAD 2000; Jones and Thornton 2003).

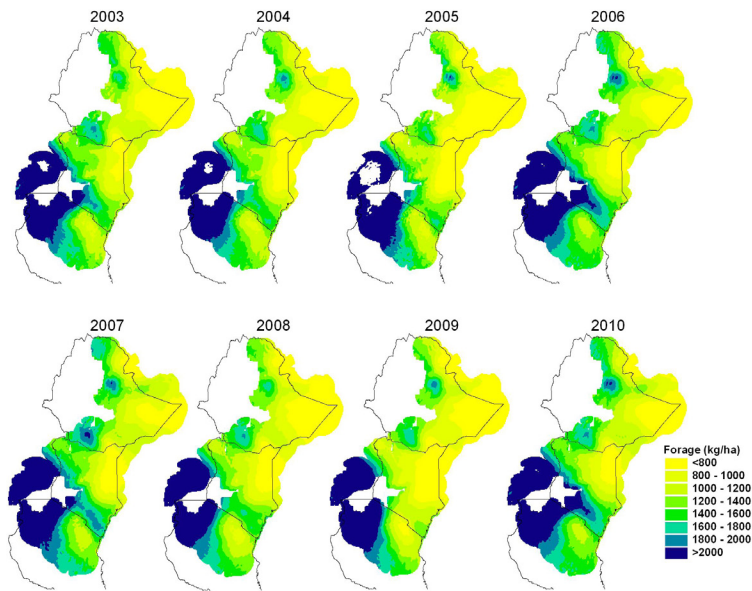
### 2.1.1 Rangeland Production

Data on forage was derived from the Livestock Early Warning System (LEWS). LEWS is an early warning system for monitoring nutrition and livestock health for food security of humans in east Africa. It uses satellite weather and Normalized Difference Vegetation Index (NDVI), ground information on soils, plants, and grazing rules that are incorporated into an analytical system to stimulate forage conditions over large regions. LEWS uses a simulation model Phytomass Growth Model (PHYGROW; Angerer et al 2001).

The project has more than 350 forage monitoring sites across the region - the data collected includes: plant species, livestock numbers, soil data, weather data and grazing preferences for the plant species. The model runs in near-real time using rainfall (derived from METEOSAT) and temperature data (maximum and minimum) provided on a daily basis by the US National Oceanic and Atmospheric Administration (NOAA). The model outputs are integrated with satellite greenness (NDVI) data using statistics to create regional maps of current forage



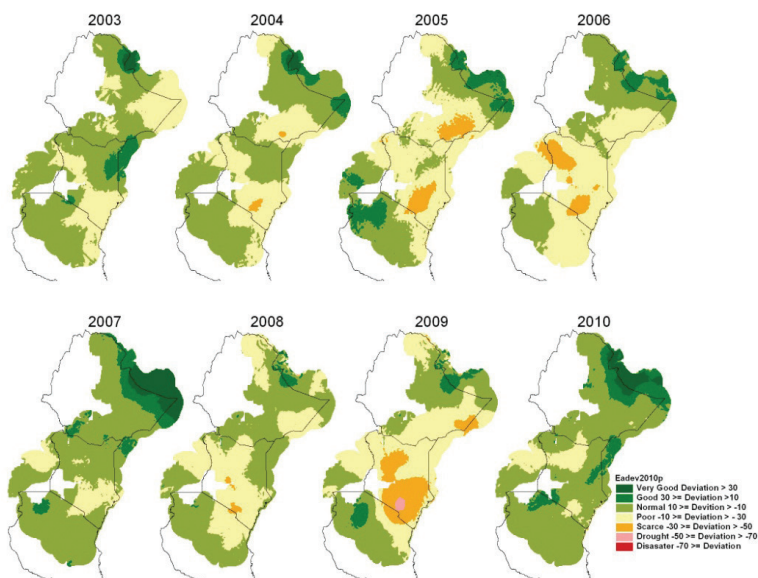
**Figure 2.2: Spatial distribution of rainfall and evapotranspiration in Eastern Africa**



**Figure 2.3:** Forage biomass as derived from satellites images and ground data

conditions that are ground checked to verify the accuracy of the maps. Figure 2.3 shows forage biomass across the countries for the period 2003 to 2010.

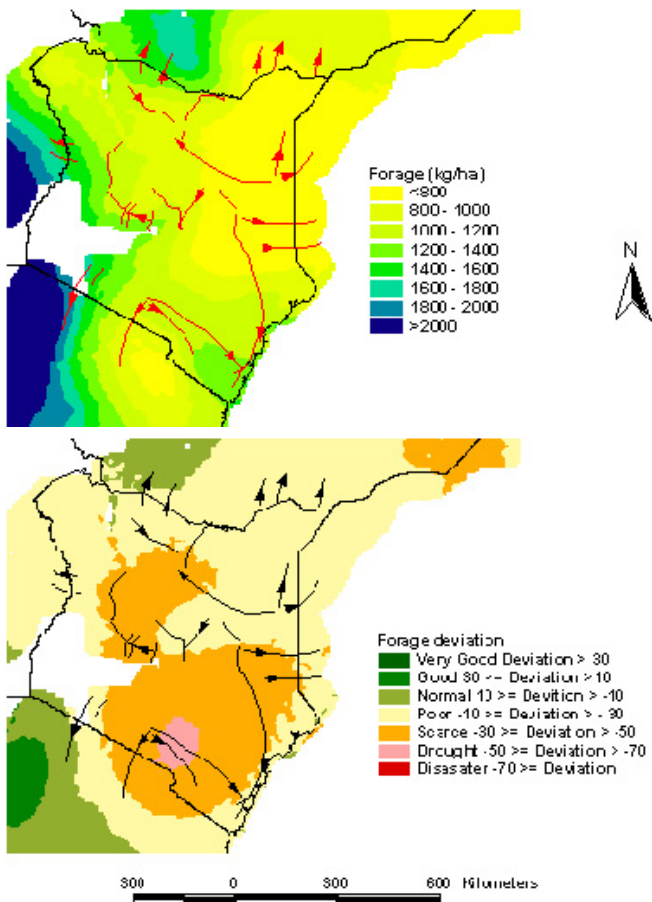
The maps of forage production show heterogeneity in terms of forage production and across high deviations from year to year across Eastern Africa. Figure 2.4 shows the deviations of forage from the long-term mean and are classified from very good (a positive deviation of more than 30%) to disasters (a negative deviation of more than 70%).



**Figure 2.4:** Forage status deviation from long-term mean

In terms of impact of droughts it varies geographically. In 2005 most of Kenya and southern Ethiopia drylands had severe droughts. In 2006 it spread further to Tanzania with conditions in southern Ethiopia improving. The droughts of 2009 were severest in central and southern Kenya and south western Ethiopia (refer to figure 2.4). Pastoralists in Kenya and Tanzania lost 70 to 90 per cent livestock (Western 2010; UNEP 2011). This was the worst drought in Kenya in the last 40 years. However, the condition in 2010 was that most areas had good rains and forage.

Figure 2.5 shows the movements of livestock in Kenya in 2009. In May after the failed rains hundreds of thousands of pastoralist across Kenya's rangelands were tracking to the highlands, down to the coast and into neighbouring Tanzania, Ethiopia and Somalia (Western 2010). Due to scarcity of forage and water a number of conflicts arose due to movements of people and livestock. The droughts in the last 10 years have forced some communities to be sedentary, increase conflicts across borders and also within the countries, but also render some communities to depend on food aid. UNEP (2011) report looked at the movements of people along the borders. It divided the clusters into four the Turkana, Karamoja, Maasai and Mander. In the Mander cluster there were movements of Kenyan pastoralist to lower Juba in Somalia. Conflicts arose based on clans and were due to new administrative boundaries the divided the people and its resources. In the Maasai cluster migration was internally and cross-border. Communities moving their livestock faced hostility from sedentary communities in Kenya and Tanzania. In Karamoja cluster there movement internally and externally and there were rampant cattle rustling, and limited security (UNEP 2011). The impact of droughts in the last 2 decades has affect millions of people in Eastern Africa (see Box 2.1).



**Figure 2.5:** Movement of livestock in Kenya during the 2009 drought. Data on movement was from FAO and on forage and forage deviation from Texas A&M. The arrows indicate movement of livestock within and across the country.

## 2.1.2 Human and Livestock Population

The human population in Eastern Africa is growing rapidly. The total human population in 2009 in the three countries is about 166.3 million people (UN 2007; Figure 2.7). In the last 50 years the population has increased four folds from a population of 40.1 million people. Kenya has the highest growth rate (2.65%), followed by Ethiopia (2.51%) and Tanzania (2.04%; UN 2007). The UN (2007) report estimates human population in Ethiopia at 83.1m, Tanzania at 40.5m and recent 2009 census in Kenya estimate the population to be 38.4m (KNBS 2010). By 2025 the regional population is projected at 242 million people (UN 2007).

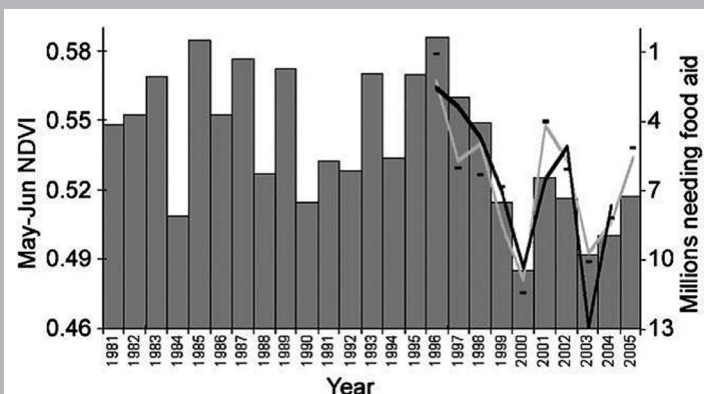
Areas of high population densities in Ethiopia and Kenya drylands are similar in that the concentration of population is adjacent to the humid areas, while in Tanzania the population has expanded more in the central areas and south of Lake Victoria covering a large part of the semi-arid zone. In Kenya in the dry sub-humid zone, the concentration of population is in the central districts, coast, southern western Kenya and parts of southern Rift Valley. In Ethiopia the concentration of the population in the dry sub-humid areas is around the central highlands.

We derived livestock statistics from FAO (2009) and regionally the livestock population is more than 139.2 million animals (includes only cattle, sheep and goats, with camels this population will be

### Box 2.1: Impacts of droughts on people

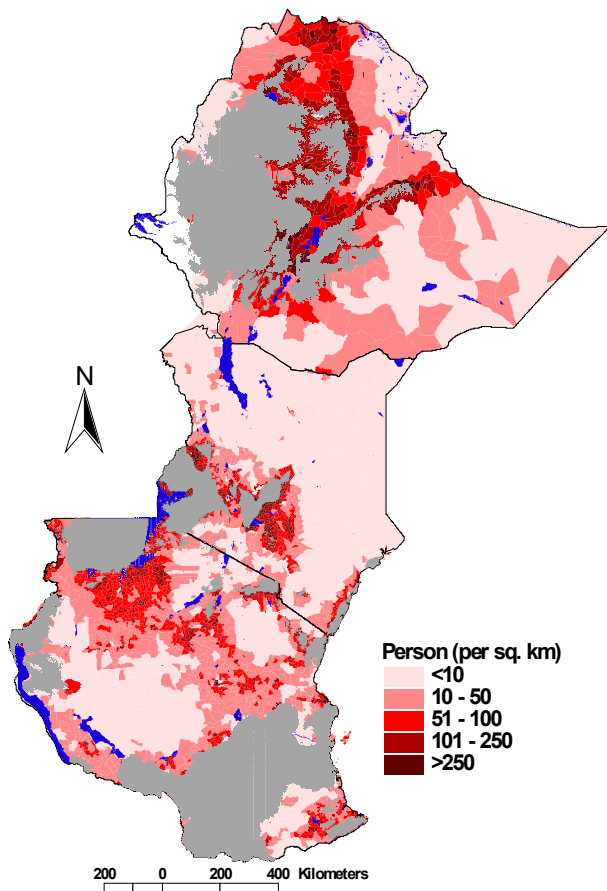
There have been notable droughts in Ethiopia and occurs every 3-5 years in northern Ethiopia and every 8-10 years for the whole country (Haile 1988). These droughts are related to ENSO activities in southern Pacific Ocean (Haile 1988; Funk and Brown 2006). Funk and Brown (2006) established a relationship between rainfall and NDVI, they analysed the May–June long-term NDVI data from 1981 to 2005 and FEWS NET estimates of people needing food aid from 1996 to 2004. Previous analyses had suggested dependence of Ethiopian crop production and food needs to Belg or long rains (March–April–May). The May–June NDVI explains 72% of the annual variance in food aid needs in Ethiopia. Figure 2.6 also shows the trends in NDVI for the months of May–June. The period 1999–2005 was of low NDVI and drought prone period. There was little time to recover from one drought to another, which resulted in about 7 million people needing food assistance.

In 2011 more than 11 million people in the Horn of Africa are confronting the worst drought in 60 years. This drought has sparked a severe food crisis and high malnutrition rates, with parts of Kenya and Somalia experiencing pre-famine conditions. This situation will be compounded by increase in rural population and little development in these drylands in terms of investment in irrigation, range management, infrastructure (roads, schools and hospitals) and markets.

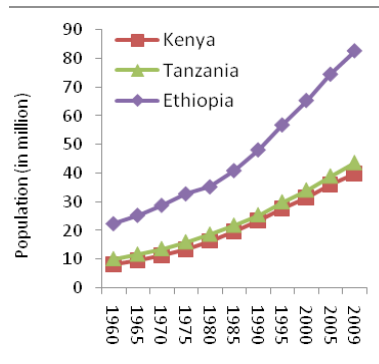


**Figure 2.6:** Plot of NDVI for the May–June 1981–2005. The black lines are the observed food aid and gray are the predicted based on the model developed. (Source: Funk and Brown 2006)





**Figure 2.7:** Human population distribution in Eastern Africa based on census for Kenya (1999), Ethiopia (2000) and Tanzania (2002). The graph shows the trend between 1960 and 2009.



higher). Ethiopia has the highest livestock population of 76.7 million animals, Tanzania 32.3 million and Kenya 30.2 million (Figure 2.8).

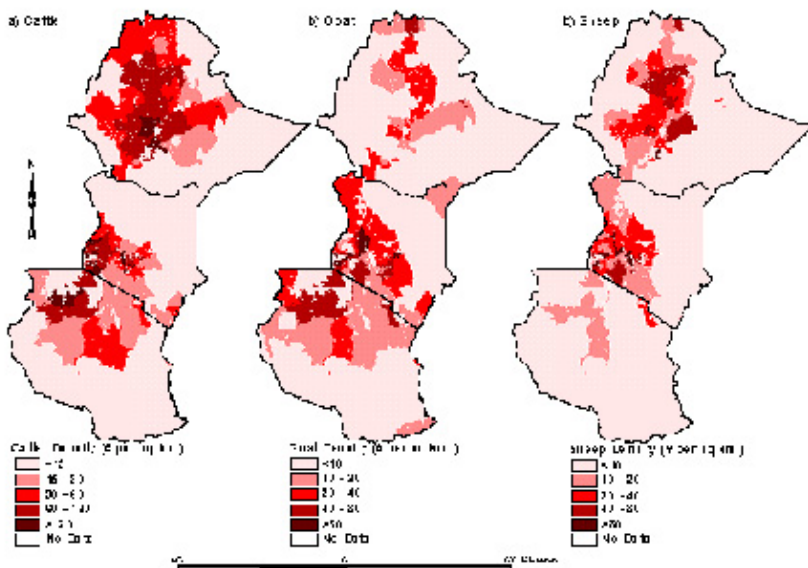
In Ethiopia half of the livestock population (more than 38 millions

animals) are kept by pastoralists in the drylands and this amounts to about 16.7 million cattle and goats and about 5.4 million sheep. In Kenya and Tanzania, more than 80% of the livestock are found in the drylands (refer to Table 2.3). In Kenya more than 14.1 million cattle and 16.5 million sheep and goats are in the drylands. In Tanzania 14.8 million cattle out of the country total of 17.3 million is found in the drylands, with a larger population of sheep and goats (Table 2.3).

## 2.2 Pressure on Natural Resources

In this study we analysed the dynamics in the key drivers of change such as human population pressure, constriction of land for used by livestock, number of livestock per person as indexed by topical livestock unit (TLU) per person. The human population censuses in the region were conducted at different times. We examined the changes in

population in Ethiopia for the period 1960 and 2005, for Kenya 1960 and 1999 and Tanzania the period 1960 and 2002. The livestock data was gathered from FAO (2007) and human population from National Bureau of Statistics (CBS 2001, IFPRI 2006 and UN 2007). Spatially we disaggregated the human and livestock data into various aridity zones. Further, we calculated the tropical livestock unit (TLU), where 1TLU was equal to 250kg. In this analysis we used the weight of cattle at 180kg, and sheep and goat at 18kg. Data on camels is missing in this analysis. We calculated per capita TLU per adult, assuming that 50% the population is above 18 years old.



**Figure 2.8:** Livestock distribution in Eastern Africa (Source of Data: FAO 2007).

Table 2.3 summarizes the human and livestock populations per aridity zones. The analysis indicates that Tanzania had the highest number of people in the drylands (59%), followed by Kenya (48%) and then Ethiopia (47%). In Ethiopia the human population increased by 61% in the dry sub-humid, by 34% in the semi-arid and arid by 276%. Kenya had the highest increase in population in all the zones by more than 300%. In Tanzania the population of people in the dry humid increased by 252% between 1960 and 2002 and in the semi-arid zones by 189%.

**Table 2.3: Human and livestock population distribution per aridity zones**

		Dry Sub-humid	Semi Arid	Arid	Hyper arid	Country Total	Dryland	% Dryland
Ethiopia	Human 1960	7782270	11108900	684888	0	38502058		
	Human 2002	12561846	14842245	2571896	0	63395140	29975987	47
	% change	61	34	276				
	Cattle	6645760	9552660	592532	0	32930152	16790952	51
	Goat	6642840	9476900	589503	0	32843943	16709243	51
	Sheep	2322410	2924970	181214	0	10967904	5428594	49
	Per capita TLU	0.86	1.4	0.38				0.92
Kenya	Human 1960	1399602	1618006	269477	1255	7648157		
	Human 1999	5917711	6723854	1462773	2692	29469222	14107030	48
	% change	323	316	443				
	Cattle	2152970	4524810	1252510	0	10083260	7930290	79
	Goat	1123610	4837780	1883570	0	9524350	7844960	82
	Sheep	1286390	3722930	3722930	0	10660470	8732250	82
	Per capita TLU	0.58	1.16	1.78	0.00			0.98
Tanzania	Human 1960	3494607	2200093		948	9045941		
	Human 2002	12300711	6365612	0	16211	31921627	18682534	59
	% change	252	189					
	Cattle	7699880	7173070	0	331	17276791	14873281	86
	Goat	4749200	4478550	0	383	11566753	9228133	80
	Sheep	1292020	1774170	0	102	3471528	3066292	88
	Per capita TLU	0.98	1.76		0.04			1.24

Tanzania also had a high average TLU per person of 1.24 compared to Kenya (0.98) and Ethiopia at 0.92. In Tanzania the high TLUs are recorded in both the dry sub-humid (0.98) and semi-arid zones (1.76). Ethiopia had very low TLU per person in the arid zone of 0.38 TLU compared to Kenya of 1.78 TLU per person. Kenya had the least TLU per person in the dry sub humid zone, indicating communities might have diversified their income through other activities (WRI 2007).

The second part of the analysis was to analyse how much of open areas are still available for livestock. We first map the protected (parks and reserves), and cultivated areas and then calculated the remaining areas. The maps of cultivation for Kenya and Tanzania was derived from Africover (FAO 2000) and was dated 2000 and for Ethiopia from IFPRI (2006).

Kenya has 72% of land surface under rangeland, Ethiopia has 63% and Tanzania has 49% (Figure 2.10; Table 2.4). Tanzania has huge tracts of land under cultivation (37%), Ethiopia (32%) and Kenya (21%). Tanzania also has the largest area under parks (14%), Kenya (7%) and Ethiopia (5%). At country level most of the humid lands in Kenya have been taken up by cultivation (86%), and more than half of the sub-humid is under cultivation and about 17% in semi arid lands is under cultivation and many of these are found in swamps, irrigated or former dry season grazing lands for livestock. A similar pattern is exhibited in Ethiopia with less crop cultivation in both the humid and sub-humid zones.

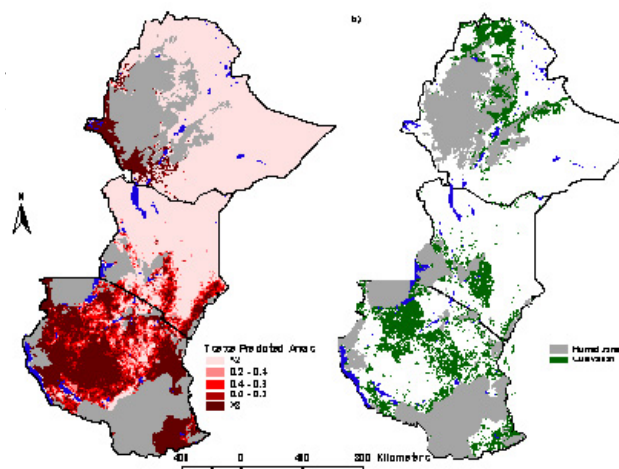
In Tanzania the extent of agriculture is almost uniform with more cultivation areas in sub-humid and semi-arid than in the humid zones. Equally open areas and protected areas are uniform through the three zones.

**Table 2.4: Areas under cultivation, protected areas and open areas**

Country		Humid	Dry sub-Humid	Semi-Arid	Arid	Hyper Arid	Total
Area (km <sup>2</sup> )							
Ethiopia	Cultivation	152,983	52,842	66,618	242	0	272,684
	Protected Areas	3,900	6,409	25,553	10,166	0	46,029
Kenya	Cultivation	50,170	25,289	44,796	2,162	0	122,427
	Protected Areas	2,004	2,647	30,776	5,263	0	40,690
Tanzania	Cultivation	100,762	144,929	99,040	0	4	344,735
	Protected Areas	52,600	47,156	35,192	0	0	134,947
Area (%)							
Ethiopia	Cultivation	53	36	17	0	0	32
	Protected Areas	1	4	7	5	0	5
	Open land	46	60	76	95		63
Kenya	Cultivation	86	53	17	1	0	21
	Protected Areas	3	6	12	2	0	7
	Open land	11	41	71	97		72
Tanzania	Cultivation	33	39	38	0	4	37
	Protected Areas	17	13	14	0	0	14
	Open land	50	48	48	0	96	49

variety of living organisms, some with very limited ranges (UNEP 2007). Most of the protected areas in Eastern Africa are located in the drylands. However, land conversion and encroachment of these areas, and virtually all other protected areas, have led to serious ecological isolation with negative effects on species richness, abundance and genetic vigour (UNEP 2007).

In Ethiopia with a total of 277 species of mammals, 29 are endemic and almost exclusively confined to the central plateaus (UNEP 2007) and 35 are threatened. Among the 626 bird species, 20 were endangered against 125 plants from a total of 6,500 that are threatened

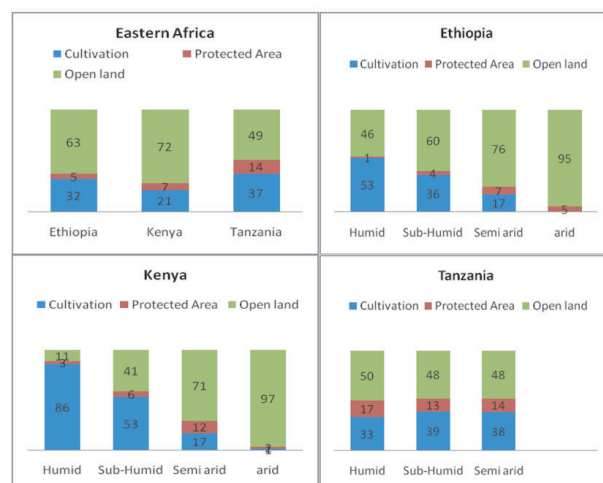


**Figure 2.9: Map showing distribution of tsetse infested areas and extent of cultivation in the drylands of Eastern Africa**

This type of spread of agriculture in drier lands can hinder mobility of pastoralists and also increase the conflicts between headers and farmers. Mobility is critical in the drier areas and in Kenya and Ethiopia open semi-arid and arid zones are critical for its pastoral communities.

### 2.3 Biodiversity

Eastern Africa's biological diversity reflects its position astride the equator and the high variability of landscapes and aquatic ecosystems (UNEP 2007). These conditions provide a suitable habitat for a large



**Figure 2.10: Percentage area under cultivation, protected area and open rangelands.**

with extinction (ref). In Kenya there are 400 mammal species, of which 4 are critically endangered, 9 are endangered, 19 are vulnerable, and 15 are near-threatened (IUCN red list). In Tanzania there are 364 mammal species of which 2 are critically endangered, 13 are endangered, 20 are vulnerable, and 17 are near-threatened.

In this study we mapped the species richness of all mammals and ungulates and the data was extracted from African Mammal Databank (AMD; Boitani *et al.* 1999). Figure 2.11 shows species richness of all mammals and ungulates. Further, through the IUCN red list we generated a list of animals that are threatened within the Eastern Africa drylands (Table 2.5). We further mapped range of each of the threatened species, see Figure 2.12.

Much of the drylands in Eastern Africa attract tourism through their extensive parks and reserves (Nassef *et al.* 2009). Kirkbride and Grahn (2008) report that tourism brings in annual returns of \$900m to \$1.2

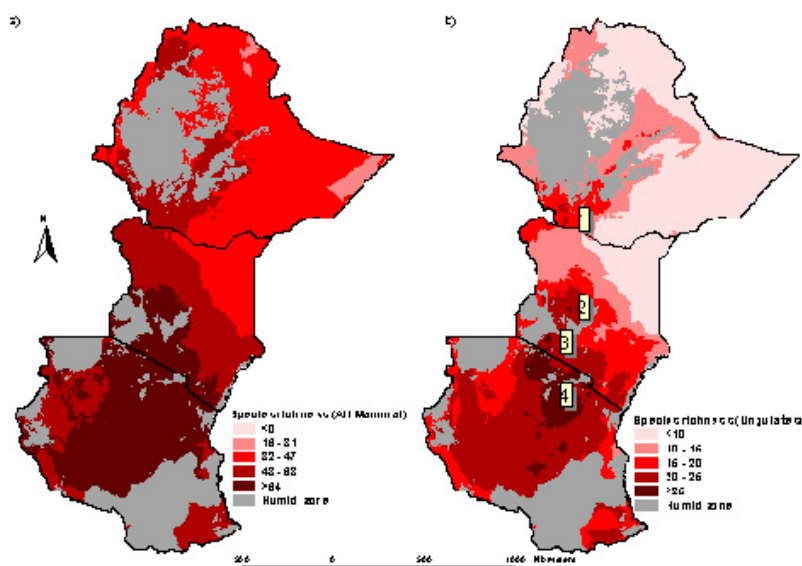
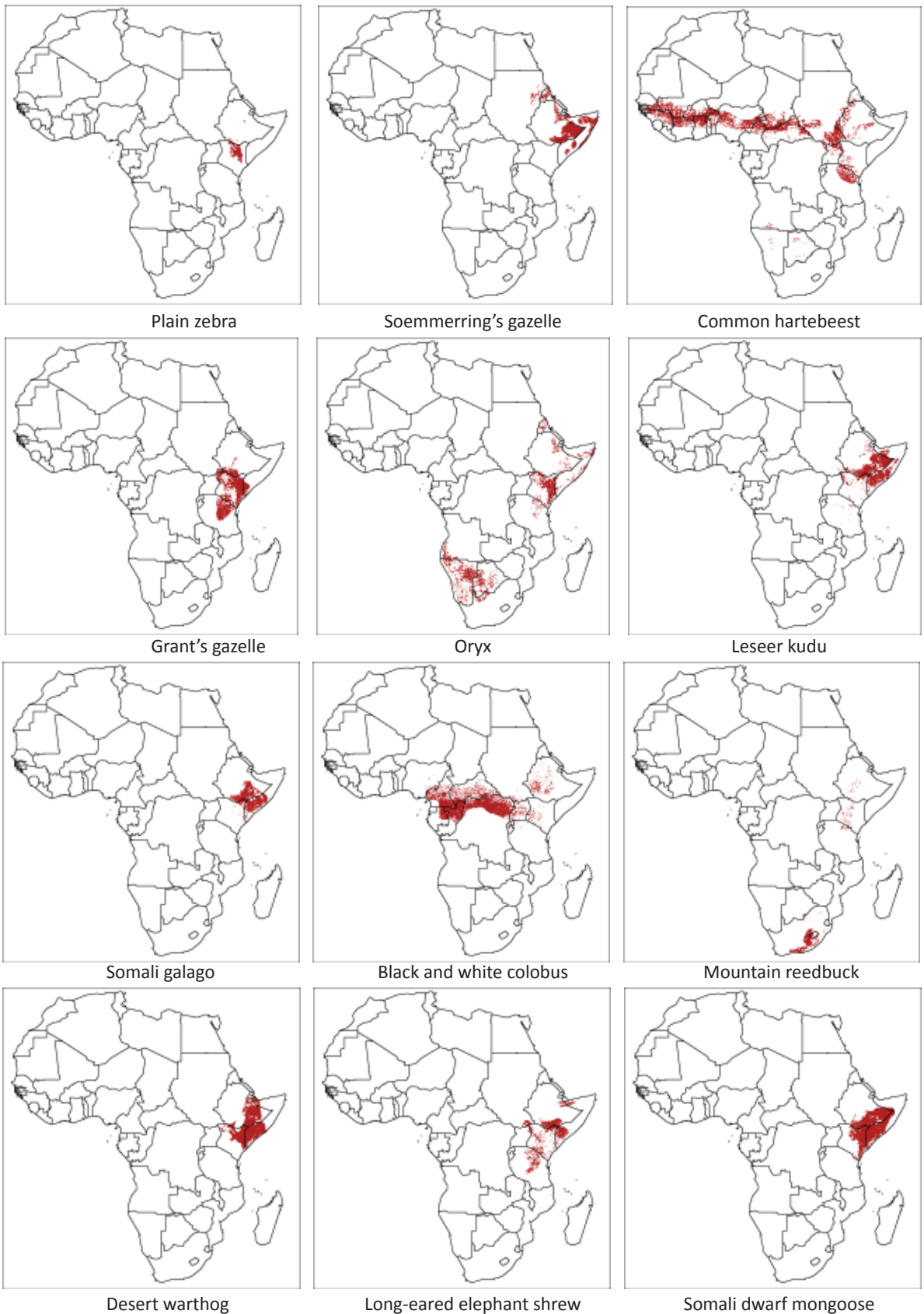


Figure 2.11: Species richness for mammals and ungulates in Eastern Africa.

billion to Tanzania’s economy and represents 13% of Kenya’s GDP. Nassef *et al.* (2009) points out that as lucrative as national parks and protected areas are to national economies in the region, they are still largely treated as revenue generating units isolated from their surroundings, ignoring vital dryland ecosystem goods and services as inputs, which fundamentally maintain the presence of wildlife populations.

Table 2.5: List of threatened species

IUCN	Common name	Scientific name	Family
EN	Plain zebra	<i>Equus grevyi</i>	Equidae
VU	Soemmerring’s gazelle	<i>Gazella soemmerringii</i>	Bovidae
CD	Common hartebeest	<i>Alcelaphus buselaphus</i>	Bovidae
CD	Grant’s gazelle	<i>Gazella granti</i>	Bovidae
CD	Gerenuk	<i>Litocranius walleri</i>	Bovidae
CD	Oryx or gemsbok	<i>Oryx gazella</i>	Bovidae
CD	Lesser kudu	<i>Tragelaphus imberbis</i>	Bovidae
CD	Greater kudu	<i>Tragelaphus strepsiceros</i>	Bovidae
NT	Somali galago	<i>Galago gallarum</i>	Galagonidae
LC	Guereza or eastern black-and-white colobus	<i>Colobus guereza</i>	Cercopithecidae
LC	Guenther’s dik-dik	<i>Madoqua guentheri</i>	Bovidae
LC	Bat-eared fox	<i>Otocyon megalotis</i>	Canidae
LC	Mountain reedbuck	<i>Redunca fulvorufula</i>	Bovidae
LC	Common, grey or bush duiker	<i>Sylvicapra grimmia</i>	Bovidae
LC	Somali dwarf mongoose	<i>Helogale hirtula</i>	Herpestidae
LC	Desert warthog	<i>Phacochoerus aethiopicus</i>	Suidae
LC	Rufous, spectacled, long-eared elephant-shrew	<i>Elephantulus rufescens</i>	Macroscelididae



**Figure 2.12** Selected range maps of threatened species in Eastern Africa.

contribution of mobile pastoralism to the maintenance of natural systems is also not taken into account, as evidenced by the limited financial benefits returning to local communities in the drylands (Tanzania Natural Resource Forum, 2008; Nassef *et al.*, 2009, Homewood *et al.*, 2009, Norton-Griffiths and Said 2010). This has lead communities to practice farming and in return these land uses have had huge impacts on the wildlife population. In Kenya the wildlife has declined by 30%-50% during the last decades (Western 2009, Norton-Griffiths and Said 2010, Ogutu *et al.* 2011). Similar declines have been reported in Tanzania (Caro *et al.*, 1998, Caro and Scholte 2007).

The importance of migration for wild herbivores is a good proof on how ecosystem services overcome borders and provide transboundary benefits. The management of the the Mau Forest in Kenya has a direct impact on the Mara Basin, which in turns provides many benefits to Tanzanian population at the other side of the border.

The emergence of conservancies in Kenya and wildlife management areas (WMA) in Tanzania is a way of capturing wildlife revenues outside protected areas (Tanzania Natural Resource Forum, 2008; Homewood *et al.*, 2009). Although it provides an opportunity for the community to gain from these initiatives, it still needs to be backed up by polices, institutions and partnership with the public or private sector. Many of these conservation areas are adjacent to the park or on migratory routes of wildlife or are secluded but of scenic attraction. These conservancies if managed well can restore some of the ecological connectivity, habitats and populations of the declining wildlife species.

These diverse and complementary values are difficult to understand and measure. National accountability systems consistently fail to capture all benefits derived from the ecosystem, and a better approach to Total Economic Valuations (TEV) is required.

# CHAPTER 3: Valuation of Land Use Options in Selected Dryland Sites in Eastern and Central Africa: case studies from Tanzania, Kenya and Ethiopia<sup>2</sup>

## 3.1 The economics of pastoralism

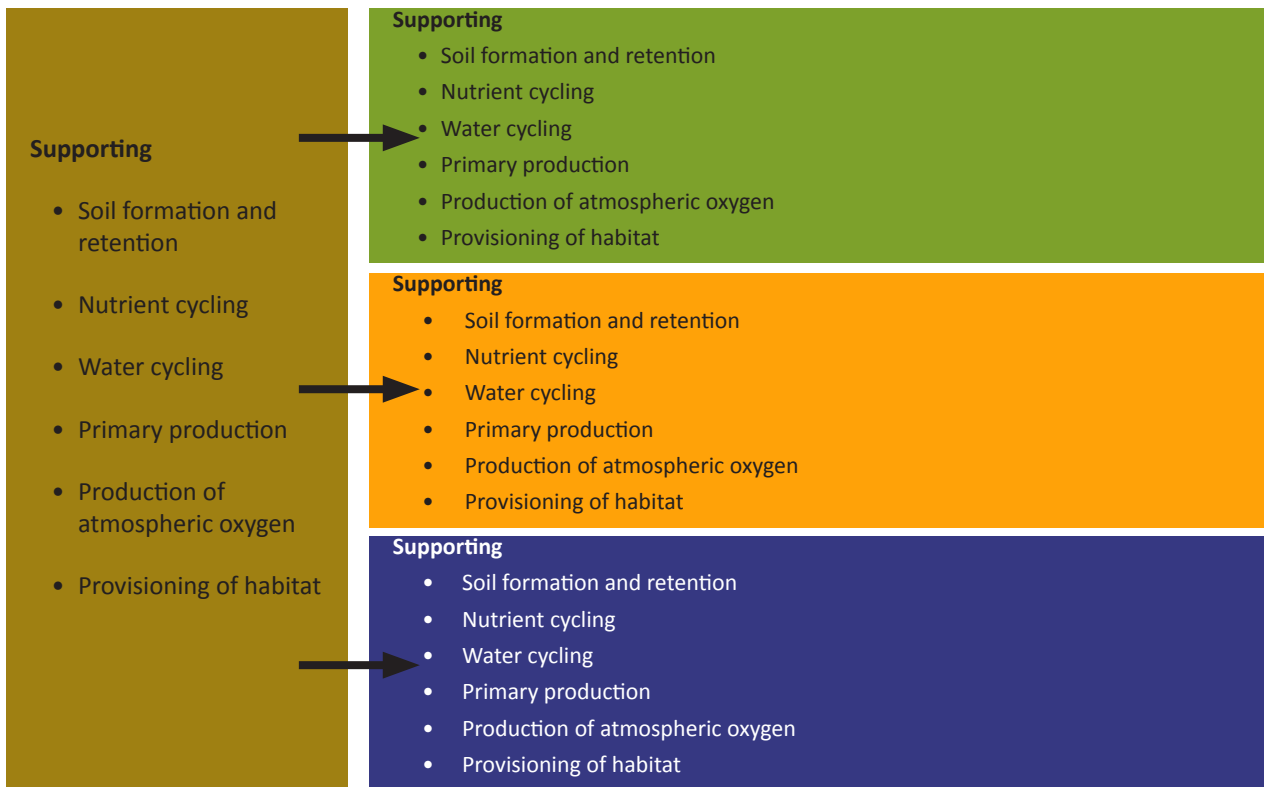
Humans rely on a multitude of resources and processes that are supplied by natural ecosystems, which collectively are referred to as Ecosystem Services. These services have been classified in four categories: supporting, regulating, provisioning and cultural (Figure 3.1). Land management practices can have an important impact on these services, and thereby indirectly on human welfare. Healthy rangelands are of value to many more stakeholders than pastoralists and the welfare and livelihoods of many non-rangeland residents is influenced by the way that rangelands are managed. The magnitude of these “externalities” may be difficult to quantify and they are generally undervalued and poorly compensated. Services such as the replenishment of watersheds or the sequestration of carbon, which are positively influenced by sustainable pastoral management, are taken for granted. Other services have already been forgone, as in drylands that have been degraded as a result of restrictions placed on pastoralism (Rodriguez 2008).

Many goods and services that are derived from pastoral landscapes and from pastoralism stand to be lost or compromised by neglect, expropriation or conversion of rangelands. Some environmental goods and services (such as carbon sequestration, protection of biodiversity or prevention of land degradation) are valued globally and if they were paid for by their global clientele they would

represent an important economic potential for pastoralists. Although systems for such payments are not widespread in Eastern and Central Africa, there are global precedents. In Europe in particular, a number of initiatives and policies have been set up to promote the environmental services of pastoralism, for example fire or avalanche control (France and Switzerland respectively), maintenance of aesthetic landscapes (UK), or maintenance of biological corridors (Spain) (Davies *et al.*, 2010).

High values have been assigned to the value of water services in drylands outside Africa: Ge *et al.*, (2005), applying shadow prices for water, estimate the value of water holding of the grasslands in the Qinghai-Tibetan Plateau (China) at USD 1524 Ha per year. Although this figure is high, the extent of drylands in Eastern and Central Africa, and the reliance of many downstream communities on water (and associated hydropower) from pastoral lands, indicates that the ecosystem services of water provisioning and regulation may be greatly undervalued and therefore poorly compensated. Carbon sequestration is another dryland environmental service that has value beyond their borders but which is currently undervalued: estimates from outside the region include USD 7 per hectare (Costanza *et al.*, 1997) and USD15.6 per hectare in China (Ge *et al.*, 2005). In Eastern Africa in particular “Big Game” tourism is a lucrative industry, the majority of which takes place in drylands. Pastoral land management plays an important role in maintaining wildlife corridors and connectivity between protected

2 Further recent information on the economic value of pastoralism in the region can be found in the studies by Behnke (2010, 2011), Behnke and Muthami (2011), Behnke and Mohamed Osman (2012) and Behnke and Nakirya (2012).



**Figure 3.1.** *Ecosystem Services (Millennium Assessment 2005).*

areas that is generally ignored and rarely compensated (Homewood *et al.*, 2001, ILRI 2006): instead wildlife populations often become a burden for pastoralists and are an important source of human-wildlife conflict.

### 3.2 Measuring the Value of Pastoralism

To ensure that the most productive use is made of rangelands resources, it is necessary to understand the value of different land use options. Research has helped to strengthen understanding of the value of pastoral land use, but this research has not gone far enough (MacGreggor and Hesse, 2006). Important outputs of pastoral systems, such as milk or transport, remain poorly measured, whilst environmental and other services are largely overlooked. Furthermore, the approach to comparing land use options is often conducted at a local scale, comparing for example the value of a hectare of riparian pasture with a hectare of irrigated cotton, but neglecting the value of that hectare of pasture to a wider pastoral system consisting of seasonally available resources (Davies and Hatfield, 2007).

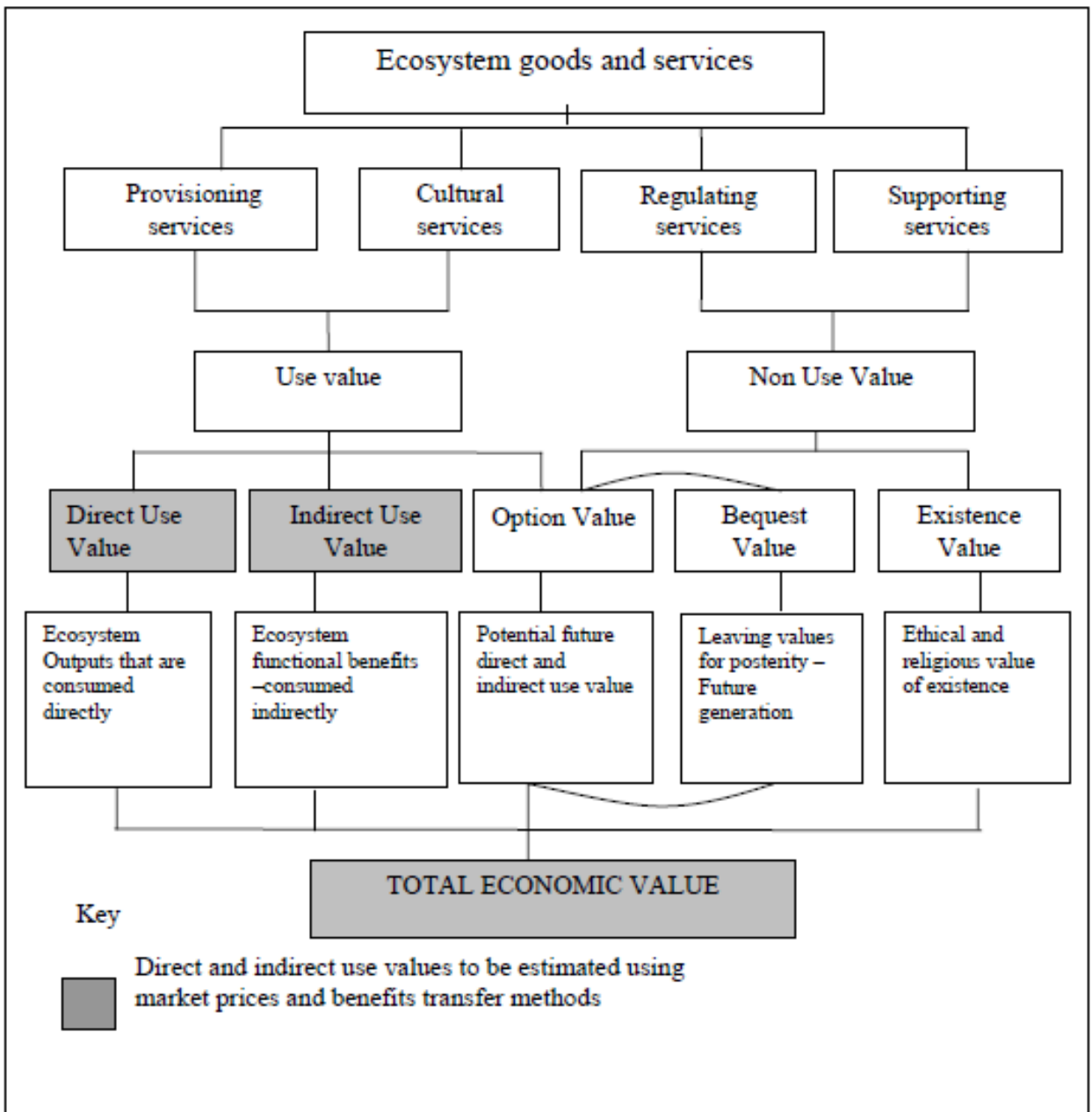
A more comprehensive understanding is needed of the multiple goods and services of different land use options at the ecosystem or landscape scale. This poses a number of challenges, since data on drylands production and ecosystem services is generally weak.

Better data is required on key values, but it is also important to develop a deeper understanding of the opportunity costs of different land use options at the landscape scale.

The term “value” is used frequently in economic and environmental discourse, although the use of the word can differ according to the context. Values relate to the relative desirability of something and are therefore used in making decisions and choices. They may be ethical principles, priorities, or trade-offs, with differing degrees of personal obligation (Keeney 1992). Many values cannot simply be measured in a common unit or currency but people nevertheless make routine comparisons between different values and take this into consideration in decision making. Finding a coherent system of measuring value, so that objective judgements can be made over the trade-offs (gains and losses) between different options, is the basis of cost-benefit analysis (O’Neill, 2007).

Valuation can therefore be thought of as a measurement of the change in welfare as a consequence of an action or event that generates price changes, quality changes or change in some public goods (Haab and McConnell, 2002). The basis of economics is that, where resources are scarce, choices must be made by individuals and





**Figure 3.2.** Conceptual framework to analyse the total economic value of ecosystems (adapted from MacGregor and Hesse, 2006).

society over their use and these choices are often based on complex trade-offs. It is this trading off of the use of one resource against another that reveals their relative economic value (Rodriguez, 2008).

It is important to recognise however that individuals do not always follow a maximization behaviour based on economic choices. Individuals may have behavioural or ethical attitudes that lead to the refusal to make trade-offs or may lead individuals to base decisions purely on moral principles (McCain, 1991). People's moral commitments can conflict with their welfare maximization behaviour, and rationality of individuality may conflict with the

rationality of social belonging. Some of these values are incommensurable and therefore economic valuations should be used with appropriate caution in decision making (De Marchi and Ravetz, 2001).

Values are categorised in different ways by different authors, but are often narrowed down to four: direct, indirect, option and existence values (Fig. 3.2). Total economic value is estimated by summing up these different value categories, but recognising that the components are not mutually exclusive and avoiding double counting (Edward-Jones *et al.*, 2002, Pearce and Warford, 1993). Total Economic Valuation (TEV) is

a tool for measuring diverse values in order to support decision making, for example by giving stronger cost benefit analyses. Many TEVs reduce values to a single unit of currency, particularly for direct and indirect values, although Option and Existence Values are usually captured qualitatively and the combination of qualitative and quantitative information provides an estimate of Total Economic Value in multiple units of measurement (Plottu and Plottu, 2007).

Although Total Evaluation has certain theoretical and methodological limitations, it can nevertheless be a useful tool for informing policy dialogue, particularly when important values are omitted from decision making processes. Valuation can be used to support the argument of pastoralism as a viable and sustainable integrated resource management system. It can be used to present evidence of the array of goods and services that are provided by pastoralist systems, but which are not captured in national accounts, and some of which are effectively valued as zero, either because they are public goods or because of market failures. Valuation can provide evidence to inform public investment and policies decisions in pastoralist areas, particularly by strengthening assessment of opportunity costs of alternative land uses. It can also provide a means of identifying and compensating globally enjoyed services in order to protect them (Rodriguez, 2008).

The misperception that pastoralism does not produce significant economic value means that governments may fail to make the necessary public investments in market infrastructure, roads, security, education and human and institutional capacity building (McPeak and Little, 2006). In most developing countries, the visible contributions of pastoralism to the economy are largely limited to the sale of livestock and some by-products, such as dairy, hair and hides. Even markets for some of these products are weak or non-existent, and since data is typically collected in the marketplace, pastoralism is invariably undervalued. However, these products do not capture the full value of pastoralism, and there is an extensive set of associated values, some more tangible than others, and some more measurable than others. Total economic valuation can therefore provide a framework for assessing the contribution of pastoralism to the national economy, but valuation does not provide simply a process of monetising all aspects of economic life: it is a means of identifying the full range of costs and benefits of pastoralism that can be used in influencing decision making (MacGregor and Hesse, 2006).

The four categories of value presented previously – direct, indirect, existence and option values – are used by MacGregor and Hesse (2006) to elaborate a framework for total valuation of pastoralism as follows:

### **1. Direct values:**

- a. Measured (e.g. livestock sales for breeding, fattening and slaughter, milk sales, hair sales, other derivatives such as hides and leather, subsistence from livestock products);
- b. Unmeasured (e.g. employment, transport, animal husbandry knowledge and skills, dryland environmental management knowledge and skill).

### **2. Indirect values:**

- a. Measured (e.g. inputs to tourism, input to agriculture such as manure or traction, inputs to dryland products such as gum Arabic, forward and backward linkages to the wider economy, taxes and levies).
- b. Unmeasured (e.g. ecological and rangeland services, agricultural services including finance and labour, global climate control, socio-cultural value, indigenous knowledge).

### **3. Option values**

- a. Derived from conserving goods and services provided by pastoralism for future use either by oneself (option value) or by others (bequest values).

### **4. Existence values**

- a. Values that are derived from the enjoyment people can experience by knowing that a good or service derived from pastoralism exists even if they never expect to use that resource directly.

For practical reasons, option and existence values are not included in the framework of MacGregor and Hesse as they are considered both difficult to quantify and hard to transform into practical policy tools. Nevertheless, they argue that aggregating direct and indirect components alone may be enough to influence government policy and are at least an improvement on the current state of valuation (*ibid.*). This pragmatic approach overlooks the possibility of millions of people living beyond pastoral borders being willing to contribute to the conservation of pastoralism and pastoralist systems and a greater effort is needed in future to value these attributes of the pastoral system.

### 3.3 Valuing System Components

National governments and some international agencies continue to support land use change from extensive livestock production to alternatives, such as crop cultivation, in the belief that the current management of drylands is wasteful, and that diverting river waters for irrigated agriculture and other economic production will yield greater contribution to Gross Domestic Product (GDP) (WISP, 2008; Niemi *et al.*, 2010). These beliefs overlook the multiple values ecosystem services and as a refuge for pastoralists to provide water and forage for livestock, wildlife habitats and biodiversity conservation. Effectively decisions for land use change are made without an effective cost-analysis: a kind of benefit-benefit analysis. Until the total economic value of ecosystem goods and services is acknowledged in environmental decision making and policy choices, the cost of the loss of these goods and services will remain unacknowledged and there will be bias against its conservation and sustainable management.

Ecosystem goods and services are critical to the functioning of ecological systems and contribute significantly to human wellbeing (Lambert, 2003). Economic valuation provides a means for measuring and comparing the various benefits of ecosystem services, and can be a powerful tool to support wise use and management of the environment (Costanza *et al.*, 1997). Thus, valuation can increase our appreciation of ecosystems and answer questions that we frequently face, such as how much do our ecosystems contribute to our economic activities at national level? Does a given land use investment justify its costs? How are costs and benefits of ecosystems distributed? Answering these questions is vital for effective planning and management.

Valuations could influence policy makers to decide how much of the scarce resources should be invested in looking after a particular ecosystem to improving livelihoods of the people and health of environment (Pagiola *et al.*, 2004). Environmental and ecological economists have developed methodologies for the valuation of ecosystem goods and services. The valuation of ecosystem services involves identifying the distribution of land uses as well as

the corresponding socio-economic benefits based on field observations and/ or literature reviews. The quantification of the market and non-market values provided by the ecosystems is based on several different approaches depending on the environmental and economic value for each of the ecosystem services that can be identified.

Each of these economic values can then be ascertained either by one of several methods, as summarised in Table 3.1. Estimating the value of ecosystem goods or services is fairly straightforward when they are traded in the marketplace – a price can be easily ascertained (Lambert, 2003). However, when there is no formal trade or system of payment, or when services are consumed or exchanged outside the marketplace, it is much more difficult to ascribe a price. The methods in Table 3.1

**Table 3.1. Common valuation methods for ecosystem goods and services (adapted from Lambert, 2003)**

Method	Description	Application	Limitations
Market prices (MP)	Values estimated from the prices in markets	Direct use values of marketable products	Inaccessible markets
Travel cost (TC)	Values for recreation estimated from tourism revenue	Demand for recreation and tourism	May place low value for protected areas
Contingent valuation (CV)	Willingness to pay (WTP) or Willingness to Accept (WTA) compensation	Applicable to all Use and non-use values of goods and services	May be difficult to use on subsistence goods and services
Benefit transfer (BT)	Transfer results of existing valuation studies in a similar context	Applicable to all ecosystem goods and services	Will give poor results if contexts differ

provide a number of ways to overcome this challenge and impute a value through other mechanisms.

### 3.4 Elements of the Value of Pastoralism Direct Values of Pastoralism

#### Dairy Production

When the value of meat and milk are compared, there often appears to be a disproportionate investment in meat and live animal trade in pastoral systems in Eastern Africa. Studies in Kenya estimate that the total milk production in pastoral systems may have double the market value of meat production, and in Ethiopia the figure may be closer to four times. Despite this, a much smaller proportion of milk is marketed, and where market data is the only source of valuation, for example in government records, the mainstay of the pastoral economy will be undervalued (Davies and Hatfield, 2007).

In countries where data collection is more rigorous, the contribution of milk to the pastoral economy is more evident. In Iran, pastoral milk production in 1998 was estimated at 384,000 tonnes of milk with an estimated market value of almost USD384 million. Additionally, much of the pastoral milk output is processed at the household level, which increases its value more than threefold. In Spain, pastoral milk production is estimated at USD1215 million per year, the majority of which is sold, also adding value through the manufacture of cheese (in the case of sheep and goat milk). Although many pastoralist societies may have taboos against the processing or sale of milk, and this is sometimes cited as a reason for not capitalising the sector, such cultural constraints have been observed to relax over time, for example in Afghanistan and Somalia (Davies and Hatfield, 2007).

## Livestock and Meat

Based on a recent analysis of data from 6 countries in diverse locations worldwide, there appears to be a degree of similarity in the level of livestock off-take by pastoralists, with 34% to 36% of small ruminants marketed each year while only 6% of larger animals (cattle, camels or yaks) are sold on average. The lower rate of sale of large stock reflects their different role in the economy as well as their longer reproductive cycle. However, as in the case of milk production, national statistics often fail to capture household livestock consumption and usually overlook informal and illegal livestock transactions.

Despite similarity in the level of livestock sales, returns from livestock sales vary significantly between countries. Spain, Mali and Ethiopia have similar national pastoralist herds (8.6, 8.4 & 9.8 million TLU respectively), yet in 2006 they recorded highly divergent sales value (USD2,300 million, USD428.5 million and USD364 million respectively). These disparities reflect price differences between Europe and Africa, as well as the greater efficiency of recording transactions in Spain (Rodriguez, L, 2008). Taking into account that the pastoralist products in Europe benefit from subventions worth a third of their value in order not to become outcompeted by products from developing countries, the proportion of unrecorded transactions could be even higher.

## Hides and Fibres

Sale and use of hides is closely related to the sale or use of livestock for meat and therefore faces a similar challenge of non-market transactions and poor data

collection. In Ethiopia, the value of hide sales is notably high, accounting for 85% of Ethiopia's livestock exports valued at around USD600 million per year. In Eastern and Central Africa animal fibre is not an important product in the pastoral economy.

## Transport

Data on the value of transport appears to be absent from published literature, which may reflect the complete absence of markets and the fact that transportation is entirely in the subsistence economy. However, the value may be significant, particularly given the abundance of animals such as donkeys and the distance of many pastoralists from marketplaces. Transaction costs, and in particular the cost of transportation, both decrease market surplus and substantially reduce the elasticity of supply and demand (Minot, 1999). In Ethiopia, pastoralists living far from the marketplace maintain transport camels explicitly to ensure that they can transport food to the household, as well as to enable them move with their herds during transhumance (Davies, 2006).

## 3.5 Unmeasured Direct Values

Pastoralism has high value as employment, providing a livelihood for many of the adults living in the drylands, even though they may not draw a direct monetary salary. The benefits extend beyond livestock producing households and include significant multiplier effects in the wider national economy (Letara *et al.*, 2006, Davies 2007). However, most other direct values of pastoralism remain unmeasured in Eastern and Central Africa. The value of rangeland management and animal husbandry knowledge and skills are of great importance yet are particularly challenging to value. To some extent these values are only useful within the pastoral system and are not readily transferable outside the system. A possible comparison could come from the capacity-building courses that are becoming common in industrial countries, where traditional knowledge on pastoralism is disappearing due to the increased ageing process of the rural population (Manzano Baena and Casas, 2010).

## Forest and rangelands Products

Natural resource users derive a range of values from their natural environment through harvesting of food, medicinal plants, construction materials and other goods. Some of these have local use value, whilst others have existing global markets, as in the case of Gum Arabic or Henna. Recent efforts have tabulated

natural grains, vegetables and fruits in Africa having significant potential to boost food supplies, nutrition and economic opportunities (NRC 1996; 2006; 2008). A number of fruits, such as the “desert date” (*Balanites aegyptiaca*) appear to have untapped potential for development which could be achieved through research and institutional support (Niemi *et al.*, 2010). In Uganda natural products from savannah woodlands/bushlands contributed to USD30 per hectare per year to the economic well-being of households (Bush *et al.*, 2004).

## 3.6 Indirect Values of Pastoralism

### Maintenance of Biodiversity

Effective grazing management can enrich species diversity and can be used to favour certain more nutritive plants over others, and grazing management is a key tool in preventing land degradation and desertification (Davies *et al.*, 2010). Appropriately managed grazing can stimulate new pasture growth, improve mulching, reduce invasive weeds and improve mineral and water cycling. The value of maintaining biodiversity in China’s grasslands has been estimated at about USD7.5 per hectare per year (Ge *et al.*, 2005), although no comparable studies have been carried out in Eastern and Central Africa.

The relationship between the practice of pastoralism and the availability of other drylands products, such as gums and resins, henna, incense or aloes, has not been clearly identified. Where rangelands are protected from cultivation through continued pastoralism, such products are likely to be protected, and development interventions have been designed on the assumption that these products can provide useful supplementary incomes that act as an incentive to sustainable land management. In traditional systems, these and many other plant products formed an integral part of the pastoral economy, but to date there has been limited integration of traditional production with the market. More data is required to generate a picture of the diverse products that can be produced from healthy multi-functional rangelands.

### Carbon Sequestration

Grasslands store approximately 39% of global carbon dioxide. Tropical savannas (264 gigatonnes) along with other rangelands (grasslands 295 Gt for, deserts and semideserts 191 Gt) have a particularly great potential to store carbon below ground (IPCC, 2000). Rangelands cover 1.5 times more surface area than forests and some

may reproduce up to 150% of their weight annually, and much of this biomass remains stored underground, thus functioning as a carbon sink. Estimates of the value of greenhouse gas regulation vary from USD7 per hectare in one global study to USD20 per hectare on Scottish rangelands and USD15.6 per hectare on Chinese rangelands, where grassland species from alpine desert ranges exhibit the highest capacity for carbon sequestration (Tennigkeit and Wilkes 2008).

### Water Holding

Water availability and distribution are essential not only for pastoralists but for millions of people living in or near the drylands, including urban consumers of water and hydroelectricity. Estimates from China indicate that the quantity of water held by different grassland types could be valued as high as USD1524 per hectare per year. Many dryland watersheds have high international significance and therefore the role of pastoralism in sustainable management of these areas may in some cases have transboundary implications (Ge *et al.*, 2005).

### Maintaining Soil

Effective grazing management can increase vegetative cover and thereby reduce soil loss and increase water infiltration. There is growing consensus that effective grazing management in most rangelands implies flexibility in stocking rates and seasonal movements between pastures, combined with skilled pasture management (Briske *et al.*, 2008, Vetter *et al.*, 2006). Soil maintenance has been estimated at USD3 per hectare per year in China (Ge *et al.*, 2005), although the interrelationship between soil health and other ecosystem services means that this estimation might be conservative.

### Promoting Pasture Growth

Fodder production in the rangelands has been valued at USD499 million per year in Kyrgyzstan and USD1400 million per year in Mali, although this value is based purely on the value of grasslands to livestock production and does not consider the amenity or biodiversity value of grasslands. No figures have been found that estimate the value of pastoralism in promoting (or impeding) pasture growth, but there is evidence that livestock grazing can be used to promote primary production of pastures (Frank and McNaughton, 1993). The cost incurred by not grazing an area may be more measureable, as in Kenya where the cessation of grazing for 8 years in a region of Pokot led to the conversion of between 8,000 and 80,000 hectares of grassland into thorn shrub with negligible productive value (Bates and Conant, 1980).

## Climate Change Adaptation

In countries where climate change causes greater climatic uncertainty or reduced levels of precipitation, leading to reduction in the area of land that can support crop cultivation, pastoralism provides an important adaptation option. Pastoral systems also harbour reservoirs of genetic diversity that may have increasing value for future adaptation. Indigenous livestock breeds have locally adapted genetic traits, such as fertility, vitality, and resistance to diseases and drought, that may prove to have significant value in the face of climate change (LPP, LIFE Network, IUCN-WISP and FAO, 2010).

## Inputs to Tourism

The environmental services provided by pastoralism, discussed above, contribute not only to ecosystem function, but to the amenity value of the rangelands, which in many countries is instrumental for generating significant income from tourism. However, the contribution of pastoralism to the tourism industry of some countries is poorly understood and figures tend to focus only on direct tourist revenues generated from visitors to pastoralist events and festivities, as in Mali where the figure is estimated at USD5 million per year. Stronger data is required to understand the contribution of pastoralism to maintaining healthy environments, and for example conserving wildlife habitat that is attractive to tourists (Homewood *et al.*, 2001; ILRI, 2006).

## Manure

Rumen fermentation of plant matter is an integral part of the environmental services of pastoralism, accelerating decomposition of plant matter and returning nutrients to the soil (Augustine and McNaughton 2006). An effort has been made to ascertain this value in Spain where it is estimated that the value of manure as fertiliser is between USD300 and USD800 million per year. Besides, the use of manure is positively correlated with soil conservation, which points to an additional value of manure in terms of prevention of erosion (Casas Nogales and Manzano Baena 2007).

## Forward and Backward Linkages

Estimating the total value of livestock production requires insight into how livestock link to the wider economy, for example through consumption of inputs such as veterinary drugs or feed supplements,

or through value addition and marketing of outputs. As mentioned above, pastoralism supports a significant part of the national economy beyond those directly involved in livestock husbandry. Pastoralist livestock in the market of Arusha, Northern Tanzania, has an annual turnover of USD 86 million, each head of cattle providing USD 173 in value added to the Tanzanian economy (Letara *et al.*, 2006). Analysis of commercial activities in Botswana found a multiplier effect of 1.8, meaning that each dollar of direct impact led to USD 0.80 of indirect impact (Madzwamuse *et al.*, 2007).

## Other Environmental Services

Other indirect values considered in this study include a wide array of environmental services, such as erosion control, water purification and nutrient regulation. In these cases, reliable data do not exist to allow reasonable estimate of the magnitude of these indirect benefits. The table 3.2 indicates the importance of certain missing environmental services.

**Table 3.2. Other indirect values of environmental services** (key: x = Low; xx = Medium; xxx = High)

Function/services	Economic values		
	Direct	Indirect	Non use
Erosion & flood control	xx		
Carbon sequestration		xxx	
Water purification		xxx	
Recreation			xx
Nutrient retention		xxx	

## 3.7 Research Findings

### Overview of Approaches and Valuation Methods used in the Case Studies

Total Economic Valuation categorizes benefits into direct commercial values but it also includes subsistence and non-market values, ecological functions and non-use benefits associated with pastoralism. It clearly demonstrates the high and wide range of economic benefits associated with drylands, which extend beyond the direct use values (Hesse and Macgregor, 2006). This chapter presents data collected from a number of studies in Eastern Africa which have employed the TEV approach in different ways, using different valuation methodologies.

Most of the data assembled were collected from a rapid assessment of both primary collection and secondary sources. The valuations were found through market pricing, travel cost, contingent valuation, or benefit transfer. Three of the four studies were able to estimate a Total Economic Value (TEV) of the study area based on aggregation of the full range of the values and benefits associated with the ecosystem services.

In assessing the economic value of dryland goods and services, the case studies emphasize the “use value” which comprises direct and indirect use values. The value of biodiversity and non-use value of dryland are not assessed in detail, and therefore the calculation of Total Economic Value is unavoidably under-estimated. The studies identify four components where data availability allows useful economic valuation exercises. These components include: direct use value of dryland goods and services in terms of local community usage; indirect use value in terms of current land use; indirect value of emerging potential land uses; and tradeoffs between land uses.

## Estimation of Values

Values are estimated from direct use by local communities and from net income generated by the locals from the dryland goods and services in terms of fuelwood, animals and animal products, small holder farming and other biodiversity products collected directly from the selected sites. In a situation where particular goods and services have market value, market prices are used to calculate the gross income generated. However, for a wide variety of subsistence products surrogate prices were used from closest substitute products. For indirect uses, the estimated values are determined by the contribution of resources in terms of environmental services to support current production and consumption. Some important environmental services of drylands are the support to climate regulation through carbon sequestration, erosion control, water regulation or air quality maintenance.

## Data Collection

Important land uses and sets of values from dryland goods and services were identified based on literature and on brief field surveys. Detailed data on some use values were derived, but it was not possible to collect time series data for goods and services whose market value is non-existent. Consequently, much of the data used in the case studies are based on secondary data from government ministries, local NGOs and other local enterprises in which the case study area is located. The research faced several problems with the secondary data. Some data are fairly recent but it was often necessary to rely on old datasets. The recorded

values of some key dryland goods and services appear to have been underestimated and their use therefore has to be made with caution.

## Research Site

### Isiolo, Kenya

Isiolo district was divided into two districts in 2007, namely Isiolo and Garba Tula. Data covering the entire former district is in many cases more prevalent than revised data that is disaggregated into the two new districts. Additionally, some data available from the Ewaso Nyiro North Development Agency (ENNDA 2010) are aggregated at the basin level rather than according to administrative boundaries. As a result not all data is immediately comparable.

Isiolo lies in Kenya’s upper Eastern province and is predominantly arid. The average annual temperature is 27° C and its average annual rainfall ranges from 120mm to 350mm (Ministry of State for Development of Northern Kenya and Other Arid Lands, 2009). The district includes the large wetlands of the Lorian Swamp, into which the Ewaso Nyiro River drains. This drainage forms the Merti Aquifer which stretches from Isiolo to through to Garissa and Wajir districts of Northeastern Province and then into Liboi into Somalia (IAEA 2000).

The new district of Garba Tula has an area of 9,817 km<sup>2</sup> and a population of 31,995, with 71% living in absolute poverty (Ministry of State for Planning, National Development and Vision 2030, 2008b). The main ethnic group is Borana and more than 60% of the district’s population depends primarily on pastoral livestock production (Ministry of State for Planning, National Development and Vision 2030, 2008b). Wildlife management and tourism form the second most significant industry, with four adjacent protected areas: Meru National Park, Bisanadi National Reserve, Buffalo Springs Nature Reserve and Shaba National Reserve.

**Table 3.3. Land use in the lower Ewaso N’ giro ecosystem (ENNDA, 2010)**

Land use	Area (ha)	Percentage coverage (%)
Woodland	651	2.87
Bushland	15,368	67.67
Bare land	3,454	15.21
Water	0	0.00
Agricultural land (dense)	34	0.15
Agricultural land (sparse)	106	0.47
Ranch	2,275	10.02
Plantation	122	0.54
Urban area	1	0.00
Total	22,710	100.00

## Mara River Basin, Kenya

The Mara River Basin is one of the most ecologically and socio-economically important river basins in Kenya, and is globally recognised and valued. The Basin forms a transboundary resource between Kenya and Tanzania and is part of the larger Nile Basin shared by nine countries in the Great Lakes region. Originating primarily from the Mau escarpment, the Mara River flows 395 km through Narok and Bomet Counties to the Maasai Mara National Reserve and finally into Serengeti National Park before it discharges into Lake Victoria at Musoma in Tanzania (NELSAP, 2002). The river has a basin size of 13,750 km<sup>2</sup>, of which about 8,938 km<sup>2</sup> (65%) is located in Kenya (Hoffman, 2007).

The basin receives a mean annual rainfall varying from 1400 mm at the upper sub-basin to about 600 mm at the lower plains (NELSAP, 2008). The semi-arid rangeland plains host animals, birdlife and nearly a million people, and diverse production landscapes supporting a wide array of ecosystem services and human needs. The river is critical to the Mara-Serengeti ecosystem, which is an important wildlife conservation area and backbone of tourism industry in the region. Over the past three decades, competition over the basin's resources has grown, between biodiversity conservation, human settlement schemes, small and large scale agriculture in the upper reaches as well as private and communal livestock grazing. A combination of upstream water abstraction, changes in land use and the impacts of climate change have caused declines in biodiversity and ecosystem values within the river basin. Large scale irrigation schemes have already caused a reduction in the size of the seasonal flooded area which impacts on thousands of pastoralists and their livestock, wildlife populations and downstream farmers that depend on the seasonally flooded areas.

**Table 3.4. Land use in the Mara River Basin**

Land use	Area (ha.)	% Cover	Sources
Agricultural crop farming	101,395	11.4	MoA/ DAO, 2009
Nomadic Pastoralist grazing	91,595	9.5	MoLD / DLPO, 2009.
Forest reserves	169,205	18.9	Mau secretariat, 2010)
Wetlands (water bodies)	2,100	0.2	LVBC & WWF, 2010
Wildlife area (MMNR)	151,300	16.9	Hoffman, 2007
Conservancies/ Group ranches	230,000	25.7	LVBC & WWF-ESARPO, 2010
Human settlements	78,800	8.8	Dahiye 2011
Irrigation crop cultivation	40,255	4.5	MoA/ DAO, 2009
Wheat farming	28,000	3.9	MoA/ DAO, 2009
Horticulture (Cut flowers, green vegetables)	1,500	0.2	MoA/ DAO, 2009
<b>Total</b>	<b>893,800</b>	<b>100.0</b>	

## Mara River Basin, Tanzania

The study site in Northern Tanzania was the Lower Mara River Basin which encompasses the Mara Swamp and the Loliondo semiarid ecosystem. The site focused on two villages: Wegero and Ololusukwani.

### Wegero Village – Musoma District

Wegero Village lies at between 1,000 and 1,200 metres above the sea level. Rainfall patterns and temperatures vary according to the topography and influenced by nearby Lake Victoria. The annual rainfall ranges from 900-1200mm and follows a bimodal pattern and temperatures range from 24°C and 32°C. The village lies in lowlands within 15km of Lake Victoria. The soil varies from sands to sandy loam and major crops grown include cassava, sorghum, sweet potatoes, maize, beans and rice. The total population of Wegero village (2002 national census) is 3,060. Projections of the population for 2010 predict a 27% increase, to 3,896. The economy of Wegero village largely depends on livestock keeping, fishing and agriculture with very few people engaged in formal employment or trading.

### Ololusukwani Village – Loliondo Division

Ololusukwani village is situated in the northwest corner of Ngorongoro District, northern Tanzania at an altitude of 1,917m. The mean annual temperature ranges from 15.6°C to 21.1°C. Rainfall is highly seasonal and extremely variable from year to year, ranging from a minimum of 400mm to a maximum of 1500mm per annum. The village is characterized by a mixture of sandy and clay soils. The village is bordered to the west by Serengeti National Park and to the north by the Maasai Mara National Reserve in Kenya. According to the 2002 National census, Ololusukwani village had a population of 3,222. Projection of the population for 2010 predicted an increase of 27% to 4,092. The economy of Ololusukwani village depends on livestock, cultural tourism, eco-tourism and small scale agriculture.

## 3.8 Qualitatively assessing values

The range of values that can be found in dryland ecosystems is vast and it was unrealistic in this study to explore more than a few key values. To help in determining the values of importance therefore the researchers set out to ascertain the values of greatest importance according to local resource users. This was a useful first step in identifying values that researchers



may be less familiar with and in helping to rationalise subsequent data collection. Data that is ranked highly but is either not easily available or not easily measured requires further research to develop estimates of magnitude. Table

3.5 provides a list of ecosystem services that was developed through local consultations in the Mara River Basin and Garba Tula district and interrogated further with local communities to rank in order of importance.

**Table 3.5. Goods and services ranked by local informants**

Category	Ecosystem service	Who benefits?	Significance
<b>Provisioning services</b>			
Food	Crops, livestock, fish, wild fruits, tubers, honey	Locals Regional consumers National consumers and businesses	5
Fibre / materials	Produced & harvested plant fibre, thatching materials, poles, fodder	Locals	4
Fuel energy	Produced & harvested firewood, charcoal etc.	Locals Urban dwellers	4
Natural medicines	Produced & harvested natural products (roots, leaves, seeds, barks, flowers, sap)	Locals (pastoralists, farmers, forest dwellers)	3
Ornamental resources	Ornamental wild plants, wood for handcraft, seashells	Locals Global tourists	3
Water quantity	The basin is an important reservoir of fresh water	Locals Regional consumers Global tourists	5
<b>Cultural &amp; social services</b>			
Ecotourism & recreation	Important recreational activities (e.g. game watching/ photographing, camping, nature walks, canoeing)	Locals traders & land owners Local authorities National companies International tourists	4
Cultural values	Cultural heritage, education & research. The basin provides environmental research and educational activities	Locals National researchers Global tourists & researchers	4
<b>Regulating services</b>			
Water regulation	Basin is important in flood control, regulating surface water runoff & aquifer recharge	Locals Regional consumers National consumers Global consumers, tourists	3
Water purification & waste management	The basin is important for natural water purification, prevention of water contaminants	Locals Traders in clean water	3
Carbon Sequestration	Climate change regulation, carbon sink, maintaining and controlling temperature and precipitation	Both socio-economic relevance and ecosystem function at local, regional, and global levels to mitigate climate change	3
Pollination	Maintenance of natural pollinators and seed dispersal agents (insects, birds and mammals)	Locals National consumers	5
Genetic / species diversity	The is important for maintenance of biodiversity (diversity of flora and fauna)	Locals National researchers & traders Global researchers & tourists	5
<b>Supporting services</b>			
Various	Primary production, nutrient cycling, soil formation, ecological interaction	Services at the river basin are socio-economically and environmentally relevant and beneficial at local, regional, national and global levels	5

1 = low significance, 5 = high significance

This assessment provides a guide to the ecosystem services that local communities value. However, caution is required as many of these services are interlinked, posing the challenge of double counting. Supporting services for example, though of obvious significance, are to some extent captured through other services, such as food production. The values of provisioning services such as crops, fuelwood and livestock partly incorporate the values of regulating, cultural and services supporting the production of these resources. Water values often reflect a number of services related to its supply, or the value of pollination may be captured through measuring crop yields (De Groot *et al.*, 2002).

### 3.9 Asset values livestock

In the four study zones of this research project, unsurprisingly livestock production was the economic mainstay, although the research has clearly demonstrated that non-livestock products and services are of considerable secondary importance. In most of the study areas pastoralists rear cattle and small stock and in northern Kenya and Southern Ethiopia they also keep camels. Data from the Government of Kenya estimates that livestock production is carried out on 36% (321, 585 ha) of the land in the Mara River Basin, with a population valued at approximately USD84million.

**Table 3.6: Estimated numbers and values of livestock in Mara River Basin (MoLD / DLPO Narok, 2009)**

Stock	Numbers	value/ unit (USD)	Total Value (USD)
Cattle	302,283	219	66,200,000
Sheep	527,126	19	10,020,000
Goats	297,977	25	7,450,000
<b>Total</b>			<b>83,660,000</b>

Over 60% of households in the Mara basin depend on livestock and livestock products as their source of livelihood (Aboud *et al.*, undated report). Besides the uses and income from the sale of livestock and livestock products such as meat, milk, ghee and hides, livestock is an important asset also associated with cultural and social values such as dowry and marriage gifts. 80% of the livestock is reared under mixed farming and pastoralist range systems. Large-scale dairy farming and sheep rearing is also practiced in the upper section of the basin.

**Table 3.7: Estimated value of livestock in Garba Tula, 2009 (MoLD, 2009)**

Stock	Number	Value (USD)	Total value in USD
Cattle	57,796	275	15,893,900
Sheep	153,060	12.5	1,913,250
Goats	145,085	37.5	5,440,688
Camels	20,046	350	7,016,100
Poultry	5,017	4.375	21,949
*Beehives (Honey/litre)	166	8.75	14,525
Donkeys	12,827	43.75	561,181
<b>Total</b>			<b>30,861,593</b>

\* One hive produces approximately 10 litres of refined honey

Data for pastoral livestock herds in the study area of Ethiopia was not available, but the total livestock population for the country is estimated to be 43.12 million cattle, 23.63 million sheep, 18.56 million goats, 4.5 million donkeys and 0.62 million camels (CSA 2007). The livestock sector is reported to contribute 12-16% of total GDP and 30-35% of the agricultural GDP (Halderman, 2004), a figure that Behnke (2010, 2011) increases to 22% and 45%, respectively. The specific contribution of pastoralism to GDP in Ethiopia is estimated at 10% (Rodriguez 2008), which would be higher following Behnke's calculations.

### 3.10 Values of livestock production

Research has shown that the pastoral livestock economy in Eastern Africa is dominated by milk production, with meat as an important secondary output, but since markets for meat are more available than for milk the value of meat is more often captured in statistics. This has the attendant risk of distorting perceptions towards meat and promoting investment in the less important part of the pastoral economy and it is necessary to use informal methods of assessment to estimate the value of milk (Davies and Hatfield, 2007).

In Ethiopia the milk produced by pastoralists represents about 65% of the national milk production, but the estimated total value of the milk produced in pastoralists systems in official statistics amounts to only USD284 million. The figure is greatly underestimated owing to the high proportion of milk that is consumed within the household and therefore not captured by markets or statistics: at least 77% of the total milk produced in pastoral areas (Rodriguez 2008). The challenge of measuring milk production remains an obstacle for appropriate valuation and has led to great underinvestment in this important pastoral subsector (Davies and Hatfield, 2007).

The case studies that contributed to this research did not ascertain figures for milk production, but recent research suggests that milk production in Eastern Africa is 2-4 times greater than the value of meat (Davies and Hatfield, 2007). Earlier research has placed milk production second to meat production at a national level in Kenya, but with both products being the largest two contributors to agricultural GDP (Karanja, 2003). Omore *et al.*, (1999) however found milk production to provide over 50% of the total value of livestock products and Nyariki (2004) finds milk production to be double the value of meat. Most of this is used in the subsistence economy, as milk is either drunk directly or processed into yogurt and other (more storable) products. These findings agree with the findings of Scoones (1995) that, other things equal, milk-oriented production systems in the rangelands of Africa are significantly more productive per hectare than meat-oriented systems.

Data for meat production in pastoral systems is better, but still inadequate since a portion of meat is also consumed in the household or is traded informally and therefore overlooked in official statistics. This underreporting and auto-consumption is probably higher in pastoral areas. Data from Ethiopia shows a sharp increase of livestock and livestock product exports over the last five years. Foreign exchange earned from live animal export has increased on average by 25.3% over the last five year regardless of world economic crises. This is likely due to considerable development in the private livestock export industry as well as growing demand for livestock products from the Middle East and Gulf States.

**Table 3.8. Ethiopian Livestock Exports**

Year	Meat export		Live animal		Increase in %
	in volume	Value	Number	Value	
	Volume (ton)				
2005/06	7,917	18,448,000	163,375	27,258,000	
2006/07	5,850	15,471,000	233,275	31,917,000	14.6
2007/08	6,487	20,958,000	297,644	40,866,000	22
2008/09	7,468	26,581,000	214,683	52,692,000	22.5
2009/10	10,183	34,002,000	333,752	90,708,000	42

Source: Customs Authority, Ministry of Agriculture and Rural Development

The major source of animals supplied to these export markets are the pastoralist and agro pastoralist areas such as Borana, Afar and Somali, supplying about 95% of livestock destined for export market. Among these major supply areas, the Borana zone of Southern Ethiopia is the major livestock supply area where almost all live animal and meat exporters are competing. There

has been growing livestock marketing in the area both in legal livestock export and domestic market from central parts of the country (Aklilu and Catley 2010; Table 3.8.).

In Ethiopia the unofficial trade and illegal cross-border sales of livestock were estimated at USD138 million per year – more than double the official statistic given above. In Ethiopian pastoralist areas it has been estimated that at least 44% of the off take of cattle, 56% of the off take sheep and 30% of the off take of camel goes to export or to illegal markets (Rodriguez, *ibid.*).

Due to the paucity of data from the case studies and the importance of livestock production, calculations in the following section use data from the literature. Norton-Griffiths (2006) estimated livestock production at USD30 per hectare in the Mara ecosystem whilst Davies (2007) estimated USD9 per hectare in Northern Kenyan drylands.

### 3.11 Crop yields

Crop production takes place in many parts of the drylands, either where rainfall and seasonality allows rainfed cultivation or where irrigation is possible. Data for crop cultivation is usually more reliable since markets are typically readily available and agricultural departments invest resources in data collection. In the Mara River Basin crop farming is the second most widely practiced land use (after livestock production) and, although it takes place mainly in the upper and middle parts of the Basin, over 19% (171,150 ha) of the total land area is cultivated. The annual value of growing crops in the Mara River Basin is estimated at USD78.9 million with per capita household income in estimated at USD226.

**Table 3.9. Value of some cultivated crops (MoA/DAO 2009)**

Crop	Yield (Tons)	Value (USD/yr)
Wheat	1,115,578	39,000,000
Maize	945,577	22,000,000
Barley	270,608	8,000,000
Potatoes	81,145	7,000,000
Tomatoes	400	110,000
Beans	20,230	1,000,000
Onions	11	20,000
<b>Total</b>		<b>78,000,000</b>

Irrigated agriculture in Isiolo District takes place on 502ha compared to a potential of approximately 1990ha (ENNDA, 2010) whilst in Garba Tula district the area irrigated is around 176ha (Niemi and Manyindo 2010). Table 3.10 provides an estimate of crop production and market value in Isiolo district, giving an average of USD 420 per hectare.

**Table 3.10: Crop production in Isiolo District in 2008**  
(MoA, 2010)

Crops	Land cover (ha)	Production (tonne)	Price/ Price/tonne (USD)	Value USD
Maize	224	385	250	96,250
Beans	157	140	625	87,500
Sorghum	14	14	312.5	4,375
Millet	5	3	750	2,250
Cowpeas	1	6	500	3,000
Pigeon peas	14	2	500	1,000
Green grams	30	13.6	875	11,900
Dolichos	4	1	500	500
Soyabeans	2	1	500	500
Sweet potatoes	23	1	62.5	62.5
Cassava	20	1	125	125
<b>Total</b>	<b>494</b>	<b>567.6</b>		<b>207,462.5</b>

### 3.12 Water

Globally the value of fresh water provision in wetlands has been estimated as USD60.2/ha (Braat and ten Brink, 2008). Other sources suggest wetlands can have higher values. Research in Uganda indicates goods and services directly derived from the country's wetlands are worth about USD300-600 per hectare per year, and less tangible services, such as water purification and carbon sequestration, may be worth as much as USD10,000 per hectare per year (UMFPED, 2004). Borrowing these data it is possible that water purification services in the lower Ewaso N'giro ecosystem could be valued at USD227.1 million per year (USD10,000 x 22710 hectares).

Using this Benefit Transfer methodology requires making some significant assumptions and the figures should be used with due caution. However, the data give us an indication of the possible magnitude of the value. The case studies highlight the importance of dryland water sources in sustaining households, livestock production, and wildlife across vast areas by providing water and forage during dry seasons. However, it remains challenging to clearly articulate the

“system” value of water that is used seasonally: riparian zones may represent only a fraction of total fodder and water input to the system, but the cost of removing that fraction may be much more significant.

Water resources in the Mara River contribute to the ability of dryland ecosystem to provide goods and services that are economically important locally, nationally, and globally. The river is an important source of surface water for domestic use, crop irrigation, livestock and wildlife watering, and recreational uses and 62 % of the population in the Mara basin utilize water from the river for both domestic and livestock use. The other sources of water include springs, harvested rain water, wells, boreholes, dams, and swamps. There are over 15 water supply schemes, 20 boreholes and 13 dams and ponds in the Mara basin, which serve the population and livestock water needs (LVBC & WWF-ESARPO, 2010).

The value of water comprises direct uses such as the domestic consumption or livestock uses and indirect uses of the environment for sustaining plant life and maintaining a dynamic equilibrium in natural processes. The total volume of water consumed annually in the Mara River Basin is about 23.8 million cubic metres (Hoffman, 2007). Of this amount, large-scale irrigation accounts for the largest proportion at 52%, followed by domestic demand and livestock at 20% and 17%, respectively (Table #). Non-consumptive water demands in the Mara River Basin are dominated by environmental flows which were recently estimated at 300million m<sup>3</sup>/year: just over 50% of the average mean runoff calculated from existing discharge records (Hoffman, 2007).

**Table 3.11: Estimated water demand in the Mara River Basin** (Hoffman, 2007)

Water uses	Water demand (m <sup>3</sup> /year)	% Water demands	Value (USD/ year)
Human Population	4,820,336	20	301,271
Livestock	4,054,566	17	380,116
Wildlife	1,836,711	8	172,192
Tourism (Lodges and Tent Camps)	152,634	1	14,309
Large-Scale Irrigation	12,323,400	52	1,155,319
Industrial & mining	624,807	3	58,576
Total water consumed	23,812,454	100	2,081,782
Non-Consumptive demands	≈300 M	-	270,000,000

According to the Water Resource Management Authority, domestic water users paid USD 0.6 per m<sup>3</sup> and non-domestic water users had to pay USD 0.9 per m<sup>3</sup> (2009 figures). The total value of water used in the Mara River Basin is therefore estimated at USD2.08million per year, while non-consumptive water demand for environmental flows is estimated at USD270 million (LVBC & WWF-ESARPO, 2010). The value of water purification has been estimated based on the cost of treating polluted water at USD288/ha/year (Dahiye, 2011).

**Table 3.12. Value of aquatic resources in the Mara River Basin**

	Area (ha)	Value/ ha	Value per year	Data source
Fish and aquatic resources	2,100	USD174	USD365,400	ENSDA, 2006

### 3.13 Tourism

Wildlife tourism generates many jobs in Eastern and Central Africa, and data from the World Economic Forum shows that, in 2008, the industry directly and indirectly generated 1.3 million jobs in Ethiopia, 483,000 jobs in Kenya, and 420,000 jobs in Uganda, or seven, nine, and seven per cent respectively of total wage employment in each country (Blanke and Chiesa, 2009). Direct employment in the tourism and travel industry accounts for approximately half of the total, with the other half accounted for through the expenditure of the industry and its employees. In Kenya it has been shown that the informal sector is greater than routinely understood, with tourism-related jobs in the informal sector outnumbering those in the formal sector (Kenya Wildlife Service 2009:5).

Wildlife is abundant in many pastoral areas of Eastern and Central Africa, but where the tourism industry is poorly developed it has been challenging to ascertain the value. Currently the value of wildlife in Kenya's Drylands (and presumably all other countries in the region) is greatly under-exploited, yet already contributes more than 13% of GDP. These values are enjoyed by residents beyond Kenya's borders and are routinely under-valued and sold below what they are worth (Norton-Griffiths, 2007). In Ethiopia, up to USD300 million per year may be generated from tourism in pastoralist regions, and in Kenya the figure may be significantly higher, although often it is non-pastoralists who capture most of the benefits of this tourism (Rodriguez, 2008).

The Maasai Mara is a global renowned and valued ecosystem that attracts a large number of tourists each year. The National Reserve and adjacent wildlife dispersal and buffer zones cover up to 1,510 Km<sup>2</sup> and 2,300 Km<sup>2</sup>, respectively and form the "Greater Maasai Mara" ecosystem, which occupies 43% of the total area of the Mara River Basin in Kenya. This forms one of the most productive ecosystems in the world with a biomass density of 30tons/km<sup>2</sup> (Homewood *et al.*, 2001). Wildlife tourism in the Mara River Basin accounts for over 18% of all tourist visits in Kenya each year (about 350,000 tourists) and over 10% of the total tourism revenue collections (about USD31.0 million: CCN & CCT, 2009). The Maasai Mara National Reserve, under the management of the Narok County

Council (NCC) and Transmara County Council (TCC) contributes greatly to the national economy. For example, in 2009 tourism revenue collected from the entry to the Maasa Mara National Reserve was about USD28.1 million while the adjacent group ranches and wildlife conservancies received about USD2.78 million (CCN & CCT, 2009). About 19% of the revenue collected annually is used to support community initiatives such as public health, education, and animal husbandry.

In the Lower Ewaso Ngiro ecosystem, tourism is focused on Buffalo Springs National Reserve, Shaba National Reserve, the Bisanadi National Reserve and Meru National Park, covering a combined area of 1846 km<sup>2</sup>. It is reported that at least 1,000 tourists per month visit the three national reserves generating revenue of about USD 120,000 per month to the council, or USD1.44million/year (Niemi and Manyindo 2010). The county council office in Isiolo has reported that about USD 2.15million was generated in 2009.

In most cases around the national park and reserves conflicts exist between wildlife and livestock, crops and other products (Norton-Griffiths and Southey, 1995), although it is recognised that livestock and wildlife can coexist (Pearce, 1997). Previous reports indicated that the tourism sector in Kenya has a huge impact on the economy but there is no comprehensive estimate of the value residents and visitors place on wildlife (Kasiki, 2009). Additionally, costs related to tourism in the drylands, such as the cost of traveling to the reserves, are poorly recorded and little of this value is captured locally in the drylands.

Previous studies have indicated that visitors to game parks and reserves in Kenya are willing to pay USD 75–195 per visitor per day (Brown *et al.*, 1994). Since on average 12,000 tourists visit the national reserves of the Ewaso Nyiro ecosystem each year, we can estimate that tourists are willing to pay about USD0.9–2.34 million for wildlife related activities and services. Research findings from other studies reported that foreigners visiting Kenya's national parks and reserves were willing to pay about USD185–485 million per year for access to wildlife and wildlife related tourism services such as lodging and cultural events (Niemi and Manyindo 2010).

Ethiopia's tourism sector is less developed than Kenya's, but still contributes significantly, and increasingly, to the country's economy, as Table 3.13

**Table 3.13. Income generated from Ethiopian tourism industry in millions of dollar**

Year	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Value in USD	68	73.8	77.1	90	114.6	138.6	170	214	204.9	226
Value from drylands	47.6	51.7	54	63	80.2	97	119	149.8	143.4	158.2
Growth rate %	-	8.5	4.5	16.7	27.4	21	23	27	-4.2	10.3

illustrates. Ethiopia is endowed with a unique combination of natural and cultural heritage, spectacular scenery, suitable climate, rich flora and fauna (23 endemic birds and seven unique big mammals) and recognized archaeological sites, including eight world heritage sites. According to the Ministry of Culture and Tourism the majority of tourism is to dryland areas: 7 out of 9 National Parks are found in pastoral areas and all of the world heritages of Ethiopia registered by UNESCO are located in drylands. It is estimated that the share of drylands to Ethiopia's tourism industry is above 70%.

This research has not explored existence values, which are challenging to measure. For charismatic wildlife and world heritage sites there is a global willingness to pay for their existence, even though many people will never visit. Research findings in the U.S. indicate that existence values associated with wildlife is about nine times the use value (Stevens, 2001). Based on this estimate, the existence values for wildlife in the lower Ewaso Nyiro ecosystem could be as high as USD19.35million per year. Drylands habitats and species were particularly associated with high existence values (Swanson *et al.*, 2004).

### 3.14 Forest/rangeland products

A variety of natural products are found in the drylands of Eastern and Southern Africa that play important roles in local livelihoods as well as national and international markets. This includes a number of plants that are used for medicinal purposes within the local economy, but whose medicinal values may not be known or acknowledged outside the pastoral economy. This research did not explore bequest values or possible values of medicinal plants as yet "undiscovered". Nevertheless, there is a wide range of herbal treatments for human and livestock diseases that are used in drylands and which are valued by the local users – particularly given the poor access to modern medical services.

Ethiopia for example has thirteen species of *Acacia*, sixteen species of *Commiphora* and six species of *Boswellia* are known as potential yielders of commercial gums and resins. Among these, gums from two species of *Acacia* and resins from four species of *Commiphora* and five species of *Boswellia* are currently produced

commercially indicating that there are untapped gums and resins still in the country. Even though production is still far below potential, Ethiopia reportedly exports on average 2519 tons per year of natural gums and resins with a value of approximately USD 34 million, increasing on average by 12% per year (Lemenih and Kassa, 2008). This value does not include the unregistered but large parallel trade across borders with neighbouring countries like Kenya, Somalia and Sudan. A further 10,500 tons are consumed domestically each year, with uses in coffee ceremonies or during chat chewing and during religious ceremonies. Despite this value, gum production is threatened in Ethiopia due to overt focus on agricultural expansion and land clearance. This is particularly risky in valley floors where *Acacia senegal* and *Acacia seyal* (providers of Gum Arabic) are most common.

**Table 3.14. Comparison of actual and potential gum and resin production in Ethiopia (2004)**

Region	Estimated actual production (in tons)	Estimated potential production (in tons)	Actual production: estimated potential (%)
Tigray	4,993	30,433	16
Amhara	2,396	16,545	14
Benshangul	316	2,500	13
Oromia	130	4,031	3
Somalia	185	4,106	5
Others	--	13,042	-
Total	8020	70661	11.34

The estimated values per household of harvested fruits in Turkana were USD56, charcoal USD80, materials for basketry USD347, honey USD667, human medicines USD2,136 and animal medicines USD2,136 (Barrow 2006). Applying these values across the lower Ewaso N'giro ecosystem (23,882 households and pastoral population 143,294) then the total economic value is about USD129.49 million ((56+80+347+667+2,136+2,136=5,422) x 23,882 households) per year. The estimated value of charcoal production was reported as about USD0.2 billion per year in Kenya of which 40% of the charcoal produced comes from the drylands (Barrow and Mogaka, 2007) and lower Ewaso N'giro ecosystem is not an exceptional of the drylands.

In Kenya's Mara River Basin, forests cover some 18.8% of the land area and form an important catchment for the Mara Basin, Lake Victoria and the Ewaso Ngiro (South) Basin in Kenya. The forest complexes in the Mara River Basin are also famous for its rich and unique flora and fauna which are the backbone for the thriving tourism in the basin. These forests yield a wide range of timber and non-timber products, many of which are used only at the household level, with 20,000 households of forests adjacent communities deriving benefits (Mau secretariat, 2010). Products include bushmeat, honey, pole wood, bamboo, firewood, charcoal, medicinal plants, and a variety of grasses and vines that are used for basket making and thatching. The forest areas host more than 47,564 beehives capable of producing 450 tons of honey annually. The annual subsistence forest use value was estimated at USD65 for a forest-adjacent household in the Mara River Basin (MoA/DAO 2009). The total annual use values of products and services derived from the forests in the Mara River Basin is estimated USD10 million (Mau secretariat, 2010).

**Table 3.15. Value of Forest Reserves in Mara River Basin (Mau secretariat, 2010)**

Land use	Benefits	Area (ha)	Value/ha	Value/year
Forests reserves	Forests and non forest products (foods, wood, medicine etc)	169,205	USD59	USD10,000,000

The value of firewood and charcoal in the Mara River Basin has been estimated at USD14 per hectare per year (ENSDA, 2006), and the value of fibre and construction materials at USD45 per hectare per year (Dahiye, 2010). By comparison, although data for Garba Tula is not available, an estimate of forest value from the former Isiolo District gives a figure of USD3, 590 collected from a forest area of 651ha (MENR, 2010).

**Table 3.16. Distribution of forest use values per household in the Mara River Basin (ENSDA, 2006)**

Forest activity/products	Value/household	Percent
Wild foods	USD2.08	3
Hunting	USD3.53	5
Utility items (wooden utensils, sticks etc.)	USD4.03	6
Medicines	USD6.24	9
Honey	USD7.53	11
Water	USD7.95	11
Construction	USD9.97	14
Fuelwood	USD13.27	19
Grazing	USD15.07	22
All activities	USD69.67	100

In the recent past, forest cover in the Mara Basin has been reduced by 23% due to forest clearing for tea and timber plantations, settlement schemes and crop cultivation (Mutie *et al.*, 2005). The riverine forests along the Mara River have also been severely reduced. The opportunity costs on local households by taking away a vital livestock reserve and reducing access to forest products could be up to USD10 million a year. Losing the river basin as a dry season refuge will have wider effects on local pastoralist livelihoods and their capacity to cope with drought. The high value of forest as a source of dry-season refuge for local pastoralists provides an important justification for conservation. The forests in Kenya are estimated to provide products worth more than USD100 million a year and save country's economy more than USD37.2 million through protecting the water catchments (Emerton and Magoka, 1996).

### 3.15 Employment

Pastoralism provides employment for the majority of residents in the drylands of Eastern and Central Africa, and the drier the land the greater the importance of pastoralism. Although the majority of the work is not salaried, pastoralism is their principal source of income both in terms of subsistence and cash. Pastoralism also generates employment in the wider economy, particularly in the marketing and processing of livestock goods. Letara *et al.*, (2006) report that each cattle sold from the pastoral economy generates 0.24 jobs associated with slaughter, distribution and other steps in the commodity chain, thus supporting 1.07 dependants. Applying this ratio to Kenya, where pastoralists sell about 3.7 million cattle into commercial markets each year (Davies, 2007), suggests pastoral activities may support an additional 880,000 jobs approximately outside the immediate pastoral production system. Additional jobs would be generated through the processing and sale of livestock other than cattle.

In Ethiopia, the gum sector – a secondary dryland product of considerable national and international importance – is estimated to generate about 25,000-35,000 jobs at the national level. Mulugeta Lemenih *et al.*, (2003) estimated that average annual cash income generated per household from collection and sale of oleo-gum resin was USD80 in Liban pastoral area whilst the contribution from crop farming was about one third of this value. Studies have shown that 57.2% of respondents in Yabello and Areero areas collect gum and resins.

Salaried work may also be more important than has hitherto been acknowledged in pastoral regions. ENNDA (2010) reported that approximately 40% of

the total working paid population in the lower Ewaso Nyiro ecosystem is supported by pastoralism. Using the minimum mean wage in Kenya as a guideline for analysis (USD38.04 per month) and a total working population in the Ewaso Nyiro system supported by pastoralism of approximately 14,156 people, this represents an estimated value of USD0.54 million annually.

Tourism and travel expenditures attracted by dryland wildlife and cultural assets also create jobs. The World Economic Forum finds that in 2008 tourism directly and indirectly generated 1.3 million jobs in Ethiopia, 483,000 jobs in Kenya, and 420,000 jobs in Uganda (Blanke and Chiesa, 2009). These numbers represent about seven, nine, and seven per cent of total wage employment in each country, respectively. According to the Ethiopian Ministry of Culture and Tourism, the majority of this tourism is to the drylands. In each country, employment in the tourism and travel industry, itself, accounted for about one-half of the total, with the other half materializing through the expenditures of the industry and its employees. Information from Kenya, where tourism related to wildlife and other attractions in the drylands is particularly notable, indicates that the impact of wildlife-related is even greater, finding that the tourism-related jobs in the informal sector outnumber those in the formal sector (Kenya Wildlife Service, 2009).

### 3.16 Carbon sequestration

Carbon is sequestered when carbon dioxide is photosynthesised by plants, and some of this carbon is released back to the atmosphere. That which remains, in living and dead plant matter, both above and below ground, makes up an organic carbon reservoir. Dead plant matter is incorporated into soil as humus, enhancing the pool of soil organic carbon (Trumper *et al.*, 2008). Since Carbon dioxide has been identified as one of the most important Greenhouse Gasses responsible for global climate change, the capacity of drylands to sequester carbon is of global importance. Savannah grassland worldwide has approximately 0.51tCO<sub>2</sub>e/ ha (metric tonnes of carbon dioxide equivalent) with a value of USD291/ ha (Tennigkeit *et al.*, 2008).

Although plant biomass per unit area of drylands is relatively low, the large surface area of drylands means they contribute significantly to global carbon sequestration. Total dryland soil organic carbon reserves comprise 27% of the global soil organic carbon reserves (MA, 2005). On average, drylands around the world hold about 14 tons of carbon per hectare, with dry sub humid and semiarid lands holding more and arid and hyperarid lands holding less (Safriel *et al.*, 2005). In Africa a very

high proportion of carbon (59%) is in the drylands and sequestration efforts need to reflect this. The value of sequestered carbon remains uncertain, but the range of estimates runs from about USD 50 per sequestered ton (Nordhaus, 2009) to USD 300 per ton (Stern 2006). Based on these figures it is estimated that the carbon sequestered in the drylands of the IGAD region<sup>3</sup> may have a value of USD 700–4,200 per hectare (Niemi and Manyindo 2010), with an average of about USD 2450.

### 3.17 Cultural value

The spiritual beliefs and cultures of dryland residents are embedded in dryland ecosystems. Studies of environmental disasters, such as oil spills, that disrupt the linkage between a community and its surrounding ecosystem can, however, offer insights into their importance (Niemi and Manyindo 2010). An assessment of the consequences of the 1989 Exxon Valdez oil spill, for example, concludes that: “Alaska Native subsistence culture is based on an intimate relationship with the environment. Not only does the environment have sacred qualities for Alaska Natives, but their survival depends on the well-being of the ecosystem and the maintenance of cultural norms of subsistence” (Gill and Picou, 1997). A subsequent summary of literature related to the spill concludes that destruction of indigenous ecosystem has a negative effect on cultural and spiritual beliefs of the beneficiaries (Snyder *et al.*, 2003). Compensation of the spill’s cultural impacts was estimated at about USD2,500 per capita per year as a replacement cost (Whitelaw, 2004).

Based on this study, Niemi and Manyindo (2010) applied an estimate of USD2,400 per person applied across the pastoral population of Kenya (7.2 million) and reported that actions that interfere with the cultural linkages between dryland ecosystems and pastoralists would impose harm at a rate of about USD450 per hectare per year. In the lower Ewaso Nyiro ecosystem, with a population of 143,294 covering 2,256,900 hectares, the figure is estimated at USD 152.38 per hectare. Evidently this figure must be approached with caution. In the first place, putting a monetary estimate to a cultural value raises moral questions, and secondly there may be a significant difference in perceptions of value between Alaska and Northern Kenya. The estimate is made here to give an indication of the possible magnitude of the value in monetary terms and in order to demonstrate the need for further research on the spiritual and cultural linkages between the ecosystem and pastoralists.

<sup>3</sup> IGAD: the Intergovernmental Authority on Development, comprising the States of Djibouti, Ethiopia, Kenya, Sudan, Somalia and Uganda.



### 3.18 Comparing Total Economic Value of different land uses

The data discussed in the previous section shows that there are important benefits from maintaining dryland ecosystems and these values go beyond grazing livestock. However, a comprehensive valuation remains challenging due to paucity of data from dryland regions and a much greater investment is required to conduct primary research to provide new data. Water-related goods and services appear particularly valuable in the drylands, especially during dry periods when they provide refuge and sustenance for pastoralists, livestock, and wildlife that, at other periods, are dispersed over large landscapes. The ecosystem plays a key role in supporting pastoral livestock production through provision of water.

Pastoralism provides dryland goods and services which are economically important to pastoralists (local), city residents (national/regional) and international beneficiaries. Maintenance of pastoral rangeland management for dryland goods and services is economically important to both pastoralists and city residents (Niemi *et al.*, 2010). For instance, if pastoralists do not supply the city residents with

meat, milk and hides, the latter will have to pay extra cost to obtain these products. Davies (2007) indicated that the average replacement cost for pastoral products in Kenya is about USD42 per hectare per year but the city residents will not incur this cost if pastoralists produce and supply these livestock products to the urban residents (Niemi *et al.*, 2010).

The data from Ethiopia shows that gum and tree resins are of high value in pastoral areas, but that value remains greatly under-utilised. These along with other forest and rangeland products boost the overall productive value of drylands. Forest products include production of fuel for cooking, lumber for housing, areas for bee-hives, and other miscellaneous products. Despite their contribution to the local and national economy and their ecological importance, dryland vegetation throughout the region is under threat. Some of the drivers of degradation include population growth and farmland expansion, lack of regeneration, human induced fire, poor management and extraction and overgrazing. An agricultural development strategy that focuses on agricultural expansion leads to official settlement in areas that already produce a stream of diverse benefits and these benefits are rarely factored into the calculations over land use change.

**Table 3.17. Summary of data presented in this report**

		Mara River Basin (Kenya)			Ewaso Nyiro River Basin		
Ecosystem Service		Total value	Area	Hectare value	Total value	Area	Hectare value
Provisioning services	Water <sup>4</sup>	2,081,782	893,800	2	-	981,700	-
	Fibre and construction materials	-	-	45	-	-	-
	Crop cultivation	78,000,000	171,150	456	-	494	420
	Livestock assets	83,660,000	321,585	260	30,861,593	667,556	46
	Livestock production <sup>5</sup>	9,776,184	321,585	30	6,008,004	667,556	9
	Wildlife (tourism) <sup>6</sup>	31,000,000	384,334	81	2,150,000	100,000	22
	Aquatic resources	365,400	2,100	174	-	-	-
	Fuel wood	-	-	14	-	-	-
	Medicines and NTFPs <sup>7</sup>	10,000,000	160,884	62	3,589	651	6
<b>Sub Total Provisioning S.</b>		<b>214,883,366</b>	<b>893,800</b>	<b>240</b>	<b>39,230,648</b>	<b>981,700</b>	<b>40</b>
Cultural services	Cultural Diversity	-	-	-	149,218,400	981,700	152
Regulating services	Water Purification	257,414,400	-	288	9,817,000,000	981,700	10,000
	Carbon sequestration	260,095,800	-	291	2,405,165,000	981,700	2,450
	Water Regulation	-	-	-	-	-	-
	Erosion Control	-	-	-	-	-	-
	Nutrient Regulation	-	-	-	-	-	-
<b>Total Economic Value</b>		<b>732,393,566</b>	<b>893,800</b>	<b>819</b>	<b>12,410,614,048</b>	<b>981,700</b>	<b>12,642</b>

4 consumptive demand only

5 Sources: Norton-Griffiths 2006, Davies 2007

6 Based on an estimate of 100,000 ha protected wildlife areas

7 NTFP: Non Timber Forest Product (also including rangeland products in this case)

**Table 3.18. Value of current local land uses in the Mara River Basin taken from various sources**

Current land use	Benefits	Value/year	Area (ha)	Value/ha	Data source
Mixed livestock and wildlife areas	Livestock assets, livestock products, tourism income	USD83,700,000	321,595	USD260	MoLD / DLPO (2009).
Forests reserves	Forests and non forest products (foods, wood, medicine etc)	USD10,000,000	169,205	USD59	Mau secretariat, 2010
Water bodies	Fish and aquatic resources	USD400,000	2,100	USD174	ENSDA, 2006
<b>Total</b>		<b>USD94,100,000</b>	<b>492,900</b>	<b>USD190.9</b>	

The data illustrate the importance that wildlife conservation and tourism can play in pastoral economies, particularly since this conservation is compatible with pastoral and other land uses. The potential to supplement pastoralism with tourist revenues may not be possible in all areas, but where pastoral lands lie adjacent to national parks they offer a promising source of income. The data presented here also illustrates the value of crop cultivation in areas where availability of water is adequate – either through irrigation or rainfed cultivation. Both crop cultivation and wildlife tourism can be compatible with pastoralism and may offer opportunities for diversification and strengthening the local economy. However, crop cultivation and wildlife tourism are less compatible with each other.

### 3.19 Estimates of Total Economic Value

It is evident from these data that huge variations will be found depending on which key values are used or omitted. Evidently the estimated value of water purification introduces heavy bias and more insight is needed to understand regulating services in general – their value as well as the cost of their protection. The following table uses similar data but focuses only on provisioning services. This compares favourably with the data for provisioning services only in the previous table.

### 3.20 Cost Benefit analysis using TEV

Land use change is taking place rapidly in many dryland areas, accelerated by a range of social, economic, political and environmental factors. Over the last three decades crop cultivation has gained importance within the Mara ecosystem, particularly linked to privatisation of land and growth in commercial farming activities. In 2007, farmlands and crop irrigation extended to over 147,490 ha of former wet-season livestock and

wildlife grazing areas (Mundia *et al.*, 2009). The forgone benefits related to the loss of livestock grazing have been estimated at USD28.3 million annually, or USD206 per hectare, with other losses related to biodiversity and wider ecosystem impact not measured.

The benefits of crop cultivation in the Mara are shown above to be around USD456 per hectare – a difference of USD250. However, the missing costs related to biodiversity and ecosystem function urgently need to be assessed to ensure that the hidden costs do not outweigh the benefits. In particular, the costs of water purification and supply appear to be high, as evidenced by recent findings in Kenya related to destruction of the Mau Forest and subsequent reductions in flow of the Mara River. Similarly, the costs of water regulation need better analysis, with increasing incidence of flooding becoming a risk as riparian and rangeland vegetation cover is removed. A more detailed assessment of costs also needs to factor in the short-term opportunity for crop cultivation on converted lands, which has been estimated to be as low as 5 years in some cases (Dahiye, 2010).

To be helpful in guiding land use planning, the planners need to understand which values apply in each location, what the costs of land use change are, and any externalities incurred through land use change: crop cultivation may entail the loss of dry season resources for wildlife; wildlife production may entail human-wildlife conflicts that have not been costed here. In reality, land users make decisions over land use based on their own needs and experiences. Many traditional pastoralists in the Mara region for example have adopted crop cultivation as a secondary or an alternative economic activity. The rationale that guides these decisions may be complex and not only based on a simple evaluation of costs vs. benefits. Cultural practices may skew interest in one direction, whilst

policy incentives may skew interest in another. For example, pastoralists may culturally prefer to raise livestock, but the ease of access to markets for grains may skew their interest toward crop cultivation.

Data on economic values may be of greater use in determining the allocation of public resources and the underlying policies. For example, where policy and investment is skewed in favour of one economic activity, a clear demonstration of the value of activities may help redress the balance. This research indicates that investment in livestock, crops and wildlife tourism needs to be balanced with the land-use potential in each district and there is no one-size-fits-all policy that can be used in the drylands.

In a district like Garba Tula where the scope for agricultural expansion is severely restricted, it is particularly important to understand the costs of lost riverine grazing and habitat on the wider ecosystem. The potential irrigable land in the district is minor, and the benefits need to be compared with the costs of restricted access for the dominant land uses: wildlife and livestock. This includes both access to riverine zones and reductions in the Lorian swamp as a result of reduced downstream flows. The direct costs of developing irrigation – finance, development and maintenance costs – have been reported to be high and these costs also need to be weighed against the benefits (ENNDA, 2010). However, the complementarity between crop and livestock production within the district needs to also be considered and appropriately supported.

### 3.21 Optimising multifunctional land use

There is a tacit belief in many agricultural ministries that crop cultivation is more desirable than livestock production in the drylands, and wherever cultivation is made possible, for example by irrigation, it should be pursued. Research from Garba Tula (Niemi and Manyindo 2010) indicates that this assumption does not always hold and tends to rest on a gross undervaluation of existing land uses and ecosystem services. The data presented here illustrate that crop cultivation can compare favourably with livestock keeping and wildlife tourism, but the extent of land that can be cultivated is restricted, particularly in drier zones, and a combination of pastoralism and conservation activities offer more potential at large scale.

A change in policy and investment is required to support a diverse range of complementary and over-lapping land uses as opposed to allocating

resources to just one or other land use option. It is possible that the aggregate values of multifunctional rangelands – pastoralism, biodiversity conservation, rangeland products and so on – can best be exploited by optimising their combined production rather than maximising the production of one or the other at the cost of the remainder. There is little doubt that both livestock and crop productivity can be significantly increased in the drylands, but the diverse array of goods that the drylands yield are vital to the resilience of dryland livelihoods.

### 3.22 Implications for Policy and Planning

The available data does not currently provide adequate guidance for policy makers to make informed judgements on the use of scarce development budgets. However, the overall value of drylands and their scope for development warrant a major increase in investment and development attention. The value of the livestock and wildlife sectors in the drylands justify much greater allocation of resources than is currently the case: although the drylands support 15% of Kenya's population and livestock is the major economic activity, they receive only 1% of the national budget; around 20% of agricultural investment is directed towards livestock, even though it provides over 40% of agricultural GDP; 75% of Kenya's livestock are found in drylands, but only 10% of government livestock staff work in the drylands (REGLAP, 2011).

Total Economic Valuation still remains weak and major missing values need to be better researched and factored into planning and policy. Even basic data on livestock production is weak and is not routinely monitored, and data on a range of ecosystem services are generally ignored. The cost of failing to value and protect ecosystem services was graphically displayed in recent floods in Pakistan that were rooted in deforestation and land-use change in pastoral areas.

To ensure that the potential costs and risks are factored into planning it is critical to engage multiple sectors and stakeholders in integrated planning across sectors. The underlying objective of this planning should be to support effective ecosystem management as the basis on which the dryland economy rests. Policy makers should understand the costs of failing to invest in certain key sectors of the dryland economy, but also the risks of disproportionate investment in one or other sector and the risks associated with policy incentives that promote unplanned land use change.



# Chapter 4: Dryland development options

## 4.1 Introduction

Drylands cover about 41% of Earth's land surface and are inhabited by more than 2 billion people (about one third of the world population; Millennium Ecosystem Assessment, 2005). Many drylands are grazed rangelands, and they are used by communities comprising nomads, semi-nomadic pastoralists and semi-sedentary pastoralists in Africa, West Asia and Central Asia (IFAD, 2000). In Eastern Africa (Kenya, Ethiopia and Tanzania) millions of people depend on the drylands (Niemi and Manyindo, 2010), and in Kenya the livestock industry alone contributes more than 50% of the agricultural Gross Domestic Product (Nassef *et al.*, 2009). However, people in the Eastern African drylands on average lag far behind on human-well being and many of its people live below the poverty line (WRI *et al.*, 2005).

Infrastructure development of roads, schools, hospitals, industries, and market centres has been neglected in the drylands (IFAD, 2000). Core physical infrastructure comprising roads, transport systems, communications, energy and water supply, housing, environmental conservation structures, including parks and forestry can play an important role in promoting economic growth and encouraging private investment in the drylands (Global Mechanism, 2008). In dryland areas, these infrastructures can contribute significantly to sustainable development and sustainable management of natural resources (GM 2008), yet large proportion of infrastructure investment has gone to support high rainfall cropping areas.

Drylands have unique and resilient species (both plant and animal) adapted to seasonal rainfall and recurrent droughts and which have developed features that enable them to provide precious environmental services such as the conservation of land, water and biodiversity (GM 2008). They are also endowed with natural properties that provide valuable substitutes for chemical components and processes in a number of pharmaceutical, energy, cosmetic and food industries (GM 2008; Niemi and Manyindo 2010). Furthermore, drylands contain vast resources, biodiversity and watersheds with potential for agriculture, fishing

and energy generation (reference). These lands have enormous potential for livestock keeping, game ranching, tourism, eco-tourism, wildlife related goods and services, game ranching, honey and gum production, carbon sequestration and other profitable activities (Niemi and Manyindo 2010; GM 2008; Nassef *et al.*, 2009). Niemi and Manyindo (2010) estimate the value of livestock-related and natural products that might be derived from dryland ecosystems in Kenya, Ethiopia and Tanzania as more than US\$12 billion. Yet, this huge potential remains largely untapped because of lack of information on what and where to invest and what are the economics returns. This chapter therefore aims at providing a spatial framework for evaluating investment options in the drylands.

Many researchers studying pastoral systems have concluded that extensive livestock production on communal land is the most appropriate use of the drylands in Africa (Behnke *et al.*, 1993; Scoones 1995; FAO, 2009). Nori (2007) argues that the mobility and flexibility of pastoral systems enables them to make the best use of the patchy and fragile environment. Not surprisingly therefore, pastoralism is one of the main traditional livelihood strategies in these dryland areas, i.e. in 69% of the total land area in the drylands of the ASARECA region.

Natural disasters in East Africa, however, frequently spark calls for the transformation, or even abandonment, of the area's prime livelihood system — mobile pastoralism based on nomadic or transhumant livestock production (IRIN, 2006; Sandford, 2006). And indeed, apart from pastoralism, a wide variety of alternative livelihood strategies have been promoted (Little *et al.*, 2008).

In addition, a substantive body of dryland research is geared towards dryland crop agriculture and, for example, irrigation and breeding of drought resistant crops. Section 4.2 gives a brief overview of these and other potential development options in the drylands. The section also highlights some of the constraints to their implementation, trade-offs that have to be taken into account and some of the criteria that influence their successful implementation.

The drylands in Eastern Africa are highly heterogeneous. Rangeland landscapes are not all the same and will respond differently to both management practices and changes in the environment. It is of crucial importance to take this complexity and heterogeneity into account when planning development investments. Development strategies need to be adapted to local as well as regional conditions. Section 5.3 therefore describes the heterogeneity of the Eastern African drylands. It does so by looking at three important dimensions: aridity, population density and market access. It further describes the delineation and main characteristics of 8 different development domains based on these criteria.

In section 5.4 the variation along the aridity, population density and market access dimension are re-visited, this time with a specific focus on development options and investment opportunities supporting pastoralism and biodiversity. Here we focus on “pastoralism and biodiversity” as a package, since we consider that to be an integrated land use strategy in its own right.

## 4.2 Potential development strategies in the drylands

A variety of income-generating activities are practiced in the arid and semi-arid zones of Eastern and Central Africa. The most widely spread livelihood strategy involves mobile or pastoral livestock production. One obvious option to pursue development and enhance the well-fare of the population is to increase the production and income generated from this specific activity. In section 4.2.1 some more information about increased pastoral livestock production can be found. A number of households, however, opt to complement their income from the livestock production through a diversity of alternative activities. Some herders remain in the sector but are diversifying their income while sustaining their pastoral livelihood. This is what we call a diversified pastoral livelihood. There is also a potential to migrate out of pastoralism into non- or marginally livestock related activities. This can be pursued in the pastoral areas or through a complete outward migration out of pastoral areas. Section 4.2.2 below highlights some of the diversification options available within the arid- and semi-arid regions.

### 4.2.1 Increased pastoral livestock production

According to many, pastoralism is the most economically, culturally and socially appropriate strategy for maintaining the well-being of communities

in dryland landscapes, because it is the only one that can simultaneously provide secure livelihoods, conserve ecosystem services, promote wildlife conservation and honour cultural values and traditions (ILRI 2006, UNDP 2006). Livestock provides a number of benefits to pastoral families in the form of milk, meat, hides, manure and others (See Chapter 4). Livestock also represent a considerable asset that can be traded or sold during difficult times or for purposes such as paying school fees or providing dowry (Nkedianye *et al.*, 2009). Apart from these livestock products, pastoral production systems also deliver a large set of environmental services. Examples and details are outlined in Chapter 4 (TEV). Clearly, enhanced livestock production in the drylands of East-Africa has economic potential and could have a positive impact on household income and food security, while pastoral livestock production is also seen to be positively correlated with maintenance of ecosystem services.

High levels of productivity can be reached in the drylands. Breman and de Wit (1983) estimate that the arid rangelands in Sub-Saharan Africa annually produce from 0.6 to 3.2 kg of animal protein per hectare, which is substantially higher than the average 0.4 kg of animal protein per hectare per year obtained in ranches in the United States or Australia under similar rainfall conditions. While part of this higher production might arguably be due to overgrazing, long-term trends show rather stable production in areas such as the Sahelian rangelands (de Haan *et al.*, 2001). This points to high productivity and resilience. In general, the pastoral ecosystem is deemed to be highly resilient and to recover quickly from common disturbances such as fire, herbivore pressure and drought (FAO, 2009). Pastoralists have developed unique mechanisms to cope with low and sporadic rainfall. Climatic variability causes direct pulses of plant production followed by long periods of plant dormancy; these pulses of production are not predictable in terms of time or magnitude (Swift and Ellis, 1988; Behnke, 1994). Grazing management in these ecosystems therefore requires adaptive planning, continuous monitoring of livestock productivity and range condition and continuous iterative decisions instead of prescripts such as uniform stocking rates (FAO, 2009). In this regard, Niamir-Fuller (1999) points out that pastoralists can maintain higher populations of herbivores sustainably if they have ensured and flexible access to the different habitats and resources in a given area. Also Swift and Ellis (1988) explain that extensive spatial scale of exploitation is a prerequisite for a successful pastoral system. The survival of herds depends on

the pastoralists' willingness and capacity to move (Gallais, 1977). Vetter (2005) warns that the reduction of mobility in semi-arid and arid pastoral systems increases the risk of degradation: it concentrates grazing pressure on the resource and reduces the opportunities for resting parts of the vegetation, while at the same time remote areas become less frequently utilized and may lose productivity in the absence of periodic grazing. Research by Little *et al.*, (2008) equally supports the importance of mobility and herd size. They observe higher vulnerability (and greater losses of livestock) to droughts amongst communities with smaller herds and less mobility. They also describe how the loss of key dry season grazing areas to crop agriculture, forestry and wildlife protection have affected the ability to sustain pastoralism in Northern Kenya. Moreover, changes in land tenure may alter the behaviour of individuals and local communities, leading to land degradation – for example, overgrazing following the settlement of nomads (FAO, 2000). These research findings suggest the need for management models which re-introduce mobility, to buffer pastoralists against temporal variability in forage availability, and to reduce localized degradation (Vetter, 2005). In addition to mobility, other options for buffering include insurance, early warning systems and contingency planning, providing supplementary feed, selling and restocking or a combination of the above. The viability of these options in different pastoral systems, and their ecological and economic consequences need to be further explored.

A big portion of the chilled meat and live animal export industries in much of the Horn is dependent on animals/products from pastoral areas and almost the entire regional cross-border livestock trade is dependent on animals produced in pastoral areas (COMESA, 2009a). Already, livestock production seems to make a lot of economic sense. Moreover, the demand for livestock products is continuing to grow due to population growth, urbanization and income growth. Connecting pastoralists to the markets and integrating the pastoral meat and milk production into the livestock value chain presents an opportunity for increased incomes. To capitalize on this opportunity appropriate sanitary standards and levels of food safety have to be pursued, market information available and access to animal health services ensured. Special attention will have to be paid to generate employment throughout the supply chain, so that this commercialization is equitable and not only to the advantage of the better-off pastoralists and middlemen.

#### 4.2.2 Options to diversify pastoral livelihoods or exit into alternative employment

The potential for increased pastoral livestock production in the arid and semi-arid regions is, however, not unchallenged. The Alive Policy Notes on Drought and mobility ([www.alive-online.org](http://www.alive-online.org)) for example talks about (i) the increasing pressure on the natural resource base due to population growth and growing competition between livestock keepers and farmers, (ii) the deterioration of internal social discipline, traditionally regulating fire, access to water and dry-season grazing, and (iii) the effects of climate change. The productivity of rangelands and livestock will be influenced by longer term changes in climate. IPCC (2001, 2007) predicts an increase of the current temperatures, and changing rainfall patterns and extreme events. According to IPCC (2001), climate induced changes in primary production of pasture will likely affect availability of forage for livestock and other mammals. Increased temperatures might also affect livestock productivity directly through changing feeding behavior (ICRC, 2005). Climatic changes may change the balance from more herbaceous species to more woody species, subsequently affecting productivity, decomposition, and fire frequency of the system, as well as forage quality. Also, the greater frequency of droughts predicted by CC scenarios might have lasting impact on stocking density, and the productivity of pastoral production systems, as shorter intervals between droughts doesn't allow sufficient time for the herds to re-establish (Herrero *et al.*, 2010). These events will also increase the risk of land degradation and biodiversity loss (FAO, 2009).

Therefore alternative livelihood strategies need to be considered, synergies sought and trade-offs between livelihood options and associated investments carefully assessed. Pastoral diversification is defined as the pursuit of any non-pastoral income-earning activity in both urban and rural environments. This includes various forms of wholesale and retail trade (e.g. selling livestock, milk, hides and skins, honey, and artisan goods etc.), rental property ownership and sales, waged employment (local and non-local, including working as a hired herder, farm worker, and migrant laborer), farming (subsistence and commercial), and the gathering and selling of wild products (e.g. gum arabic, firewood, or medicinal plants) (Little 2001). Income diversification can be used to recover from shock-induced herd losses and to supplement rather than replace livestock-based incomes. Diversification in this sense is seen as a mechanism for adding economic value in pastoral communities and regions and for helping to maintain pastoral livelihoods (COMESA, 2009b).

There is also a potential to migrate out of pastoralism into non- or marginally livestock related activities in pastoral areas or complete outward migration out of pastoral areas. Little *et al.*, (2008) findings, however, indicate that poverty is usually most prevalent among sedentary pastoralists no longer directly involved in pastoral production or those who are now exiting the system or are likely to do so in the next few years. These groups are (or will be) most involved in unskilled wage work, petty trade, and low-cost services and will rely heavily on cash to purchase required foods and other necessities. Current policies that favour non-pastoral uses of land, sometimes by migrant communities, can further aggravate these problems by making those who still maintain a viable pastoral livelihood and generate most of the economic value in the area vulnerable. As more of these vulnerable herders drop-out of pastoralism, the urban centres are likely to continue to grow and appropriate urban planning and investment will be required.

Diversification options include crop production, other natural resource based activities and a non-natural resource based economy.

**a. Crop Production:** When enough labour is available, small-scale cropping is possible in the relatively wet areas or with the application of irrigation. In these circumstances it offers the opportunity of a relatively stable income addition. Some of the negative outcomes include soil compaction, pest and diseases and nutrient mining (Nyamwaro *et al.*, 2006). Often it is practiced in key dry season grazing areas and water points. In that case, it might negatively affect the ability of herders to access key resources during periods of need, make pastoralism less sustainable over time, as well as generate local disputes and destructive conflicts over these key resources (COMESA, 2009b). It is therefore important to implement a cropping system that exploits the potential complementarities between crop production and pastoralism and promotes integrated crop-livestock production at the landscape scale. This includes ensuring mobility and (at least seasonal) access to key resource patches. The Worldbank and FAO (2009) talk about a considerable potential for large-scale commercial farming in the relatively fertile and sparsely populated drylands. Success in capitalizing on these opportunities will depend on getting policies right, strengthening institutions, and scaling up investments in agriculture. Potential negative outcomes of this intensification include deforestation, biodiversity

losses, degradation of soil and water resources, illness caused by crop chemicals, vector-borne arbo-viruses and social inequity. Some see great opportunities for the development of biofuels and, in the dry areas, more specifically *Jatropha* plantations. *Jatropha* is resistant against drought and does not require many external inputs. As it needs to be harvested by hand, it can only be applied in places with relatively high labour availability. Large scale production of biofuels does provide options for rural development, but could cause a reduction of the production of food staples (van Wesenbeeck, 2008).

**b. Other natural-resource based activities:**

- 1. Conservation:** Wildlife Tourism generates significant income in many countries of the East-African region. It also generates jobs, both formally and informally. On the downside, land is sometimes lost to national parks and conservation areas, with the revenue not necessarily directed back to the pastoralist population, but rather excluding them from exploiting the grazing potential and restricting their pastoral mobility. Some wildlife tourism is organized in community-based conservancies and promotes integrated livestock-wildlife conservation. We refer to chapter 2 for an overview of opportunities, constraints and threats associated with these community-based conservancies.
- 2. Carbon sequestration:** Grasslands store a lot of carbon dioxide. If the grassland becomes degraded or is converted to cropland, it loses its capacity to store this carbon. So pastoralists, by helping to maintain the grasslands, are playing a key role in carbon sequestration. According to FAO (2009), the potential to sequester carbon through improved rangeland management is significant. Such management practices include restoring organic matter to soils, reducing erosion, and decreasing losses resulting from burning and overgrazing. An added advantage of carbon sequestered through higher soil organic matter is the increased water holding capacity and rainfall effectiveness (FAO, 2009), as well as the enhanced biological diversity (Lal, 2004a). The capacity to sequester carbon depends on the climatic zone, the past history and status of the land resources such as soil and vegetation, and the opportunities available to change management practices (management



techniques, competition with other land uses, economic tradeoffs, land tenure, social organization, incentives and political will). Through for example the REDD program, opportunities exist to generate income through carbon sequestration.

**3. Collection/sale of natural products (gum Arabic, charcoal, honey, ...):** Dryland commodities could potentially catalyse growth and offer high returns in the arid and semi-arid regions. Numerous NGOs and CBOs are increasing community awareness in the commercial wealth that exists in a variety of tree crops and shrubs that grow naturally and in abundance in these areas, especially in the more arid areas. Communities are waking up to the wealth they have been squandering by exploiting the resources to produce charcoal and firewood. The interest in perceived benefits of dryland commodities derived from various plant species such as *Acacia senegal* (gum Arabic), Aloe species, *Jatropha curcas*, *Azadirachta indica*, among others, is fast growing. Natural resource experts value the soil fixing and regenerating value of these trees. Environmentalists concur and also see growing opportunities for propagating such trees to tap into the increasing demand for carbon trading and payments for ecosystems services.

c. **Non-natural resource based economic activities, such as waged employment, handy craft, petty trade and provision of services.**

#### 4.2.3 Trade-offs

The drylands in Eastern and Central Africa produce a lot of highly valued services, ranging from meat and milk production over biodiversity and carbon to tourism and cultural values. When planning the use of these lands, choices will have to be made. Considerable ecological, market and climatic diversity exists and this diversity strongly influences what local land use options are available (COMESA, 2009b). The impacts of the available livelihood options will have to be evaluated against different objectives, such as increasing food production, enhancing livelihoods (in terms of income or food security), and maintaining biodiversity or environmental sustainability, and weighted accordingly. While some land use combinations enhance complementarities, others involve making hard choices and complex trade-offs.

The development of rural livelihoods typically involves a mix of interventions. Each of them with different potential impacts on the direct and indirect landscape benefits. Chapter 3 has given more details about economic valuation of the ecosystems services that are provided by the different land use options, touching on the potential opportunity costs of different options at the landscape scale. Still, the complementarities between different forms of land use practices needs to be understood better.

Another challenge is presented in terms of spatial and temporal scales. The drylands are complex socio-ecological systems with many levels. Short-term benefits can be outlived by long-term negative consequences. Interventions with positive outcomes at the local level often have disastrous effects when evaluated at a larger geographical scale.

In summary, there's a need to optimize the system/ wider landscape and look far beyond the maximum use of separate patches.

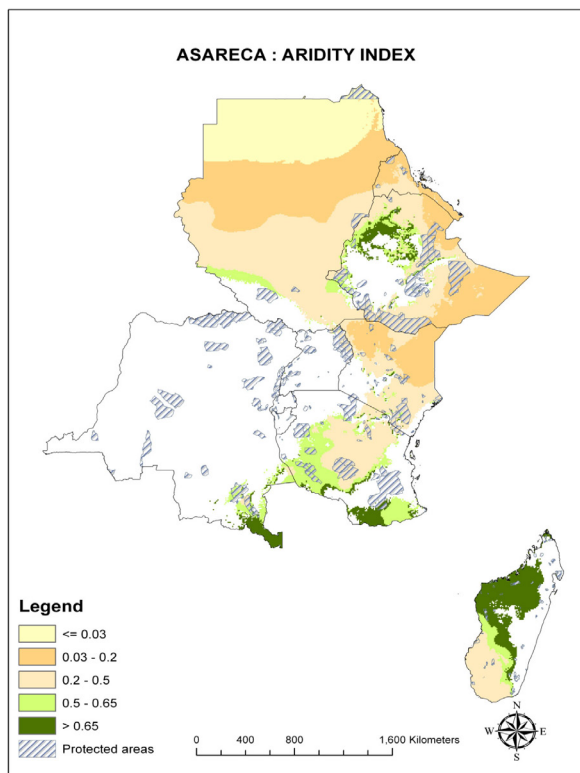
### 4.3 Heterogeneity of the drylands in Eastern and Central Africa

#### 4.3.1 Aridity, market access and population density

The dryland areas in Eastern and Central Africa are highly heterogeneous. Climatic conditions for example go from hyper-arid to sub-humid and vary considerably in rainfall variability. Soil characteristics and fertility show highly varied spatial patterns. Also in terms of socio-economic variables a lot of variation can be seen. Population density ranges from almost nobody to more than 200 people per square kilometer (fig 4.1). More maps showing the heterogeneity of the ASARECA drylands in terms of these and other variables are shown in annex 4-1.

Although the heterogeneity can be described in terms of many different variables, we focus here on productive potential, population density and market access because of their strong influence on the nature of opportunities present and investments needed. The productive potential and nutritive value of pasture decreases with increasing aridity. Figure 4.1 below shows a map of the aridity index (AI). The AI is defined as the ratio of available precipitation over atmospheric water demand. The atmospheric water demand or potential evapotranspiration, in turn, is a function of temperature

and radiation. A lot of variation can be seen across the Eastern and Central African drylands. Huge chunks of Sudan, Ethiopia and Kenya exhibit an AI below 0.5 and can be classified as arid and semi-arid. Moving towards the highlands in Ethiopia or more southwards into Tanzania and Madagascar we find a considerable area under dry sub-humid conditions. These areas have a –relatively- good productive potential.

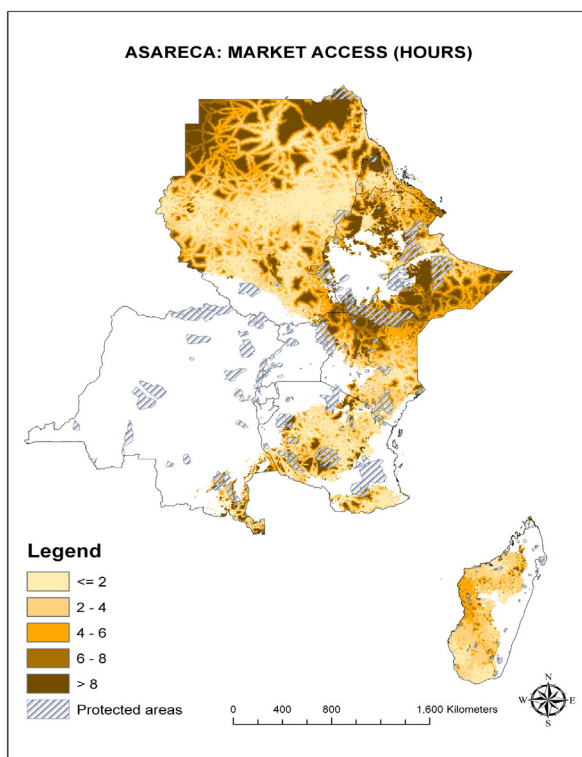


**Figure 4.1:** the aridity index

Proximity to urban centres affects the number and range of options open to those interested in livelihood diversification. According to research undertaken by Little (2001), pastoralists residing less than 40 km from towns typically have more alternative income generating options than those living further away. According to Little *et al.*, (2008), however, there appears to be a trade-off between the disruption to the pastoral production system brought about by restricted mobility and increased benefits of access to markets. They argue that the conditions to move opportunistically in response to uneven rainfall patterns and forage production are most constrained near towns where markets are found but more favourable in remote rangeland zones. As permanent settlements appear and continue to grow, there is a need to ensure mobility and connectivity to key natural resources. Strengthening the urban economy needs to go hand in hand with regional planning so that the rural

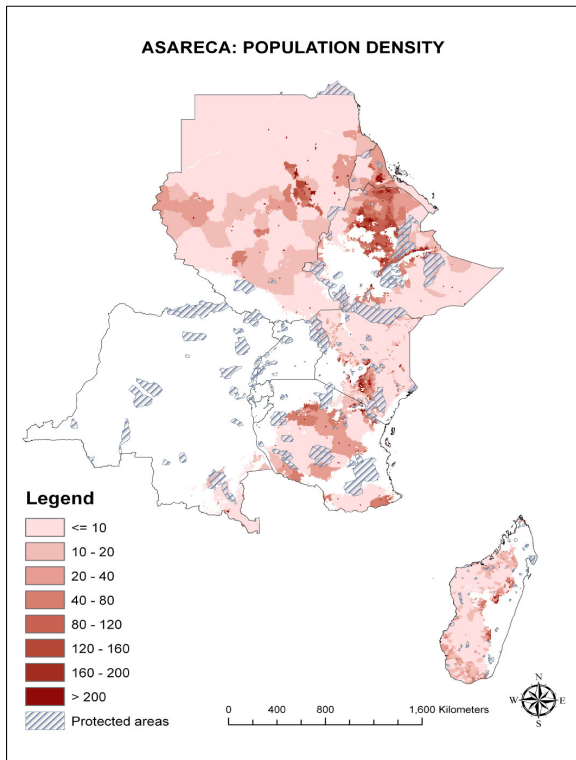
development is not compromised. There is an urgent need to plan and guide this currently spontaneous and uncontrolled process of pastoral urbanization.

Physical access to the markets can be expressed in the time it takes to travel to these markets. Figure 4.2 below shows the estimated time to travel from any location to the nearest city with a minimum of 50,000 inhabitants. A range of very remote to relatively well-connected areas can be found in the Eastern and Central African drylands.



**Figure 4.2:** Travel time in hours to the nearest city of more than 50,000 inhabitants

Also in terms of population density a huge variation can be seen (fig. 4.3). Ranging from very low population density in some of the dry areas in e.g. Sudan, Kenya, Ethiopia to quite high population figures of more than 200 per square kilometer in, for example, Ethiopia, the population density averages out to about 25 people per square kilometer. Where the population pressure increases, the need to diversify the economy (both diversified pastoral livelihood and exit / both natural resource based and non natural resource based) increases. This diversification will be facilitated by access to credit to enable investments. Population density is also a proxy for labor availability. Labor is an important input in pastoral systems, but might especially become a constraint when pastoralists diversify into non land related activities (CCER, 2010).

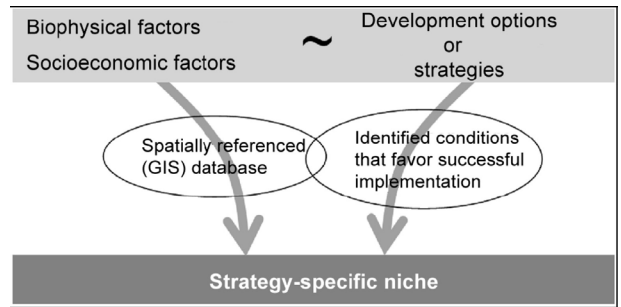


**Figure 4.3:** Population density

### 4.3.2 Dryland Development Domains

This spatial heterogeneity influences the applicability and impact of interventions, as well as the need for specific investments and policy support. Development should aim at delivering policy, institutional and technological strategies that are well targeted to the heterogeneous landscapes and diverse biophysical and socioeconomic contexts in which the livestock system is operating (Pender *et al.*, 2006). Spatial analysis can address the information needs this targeting process creates and can help us to characterize the different components of the production systems. By matching conditions favoring the successful implementation of a development strategy with a spatially referenced database, it is possible to delineate geographical areas where this specific strategy is likely to have a positive impact (see Fig. 4.4).

From an agricultural development perspective, absolute and comparative advantages of different communities are fundamentally important frames for designing development strategies (Chamberlin *et al.*, 2008). Application of this concept in the field of rural land use planning is routinely done through the delineation of recommendation domains or development domains. Development domains are geographical units in which similar agricultural development problems or



**Figure 4.4:** The use of GIS for geographical targeting and out-scaling.

opportunities are likely to occur. Recent empirical studies in Uganda, Ethiopia, and Kenya (Ehui and Pender 2004) suggest that agricultural potential, in combination with access to markets and population density provides good explanatory power in predicting the type of agricultural enterprises and development pathways encountered in different rural communities. Each of these three criteria can be modeled, mapped, reclassified, and spatially combined into different development domains. The assumption is that agricultural strategies are likely to have the same relevance for areas falling in the same domain, which straddle across regions and administrative boundaries. Following these insights, Omamo *et al.*, (2006) used GIS analysis to disaggregate the ASARECA region based on spatial layers of agricultural potential, market access and human population density. The figure below shows the development domains they developed to set strategic priorities for agricultural development in ECA (Omamo *et al.*, 2006). Development domains are defined using consistent data and criteria across the region, thus helping diagnose development constraints and formulate and evaluate strategic intervention options in comparable ways.

According to these criteria, there is little differentiation within the dry areas and more refinement is needed to target the different development strategies within the drylands. We therefore went ahead and delineated specific Dryland Development Domains (DDD) based on the same three criteria (productive potential, market access and population density) but with adjusted source data and adapted thresholds.

**Aridity:** We classified the drylands of the ASARECA region according to the aridity index: arid and semi-arid areas (with an aridity index below 0.5 indicating low suitability for agriculture) were separated from the dry sub-humid area (aridity index between 0.5 and .65 and relatively good production potential). The data was sourced from the CGIAR-CSI Global-Aridity and Global-PET Geospatial Database (Trabucco and Zomer, 2009).

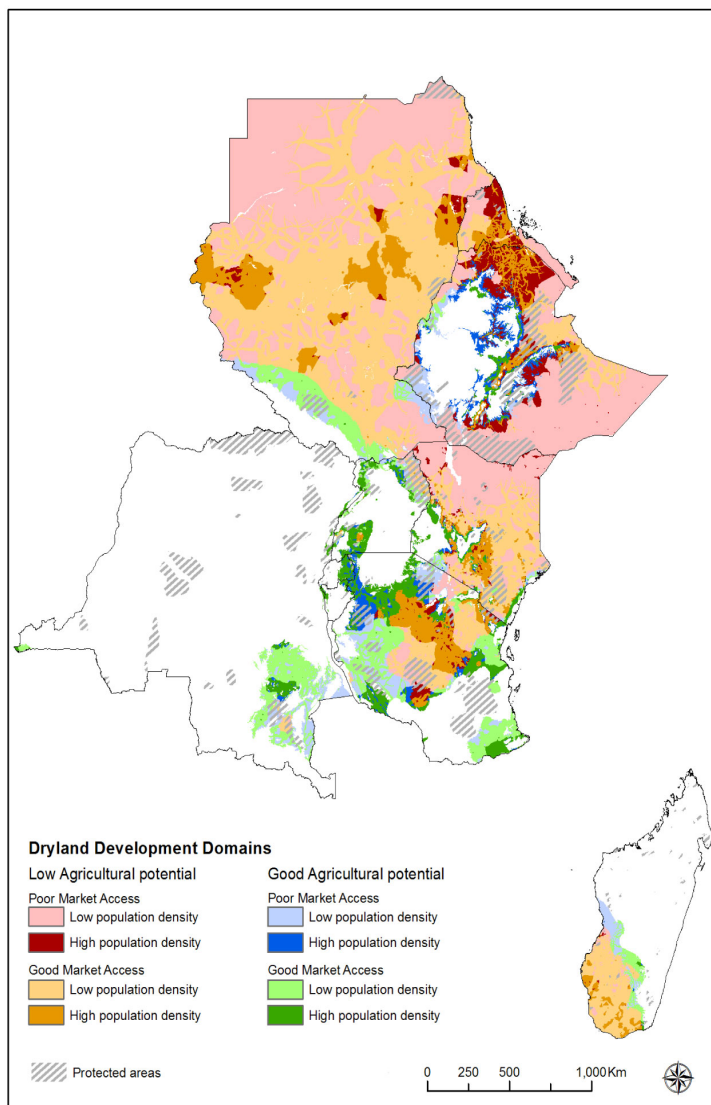
**Market access:** In this analysis we used a GIS layer produced by JRC (Nelson, 2008) modeling the time needed to travel to the nearest settlement of at least 50,000 inhabitants. Areas with a traveltime of more than 4 hours were classified as having low market access, whereas areas with an estimated traveltime of less than 4 hours were classified as having good market access.

**Population density:** The most important way in which population density is expected to influence community-level development options is through enabling of labor-intensive livelihoods and land management approaches (Chamberlin *et al.*, 2006). Higher population density may stimulate the development of local markets and infrastructure, it increases the local demand, and is likely to reduce transaction costs (Pender *et al.*, 2001). Human population has been shown to be strongly related to the amount of land cultivated (Reid *et al.*, 2000). Kruska *et al.*, (2003) estimated that a threshold of 20 people per square kilometer will generally be equivalent to 15-25% of the land cultivated. We used this same threshold to differentiate between sparsely (or lowly) and densely (or highly) populated areas.

These domains were characterized according to a number of bio-physical and socio-economic traits. Through GIS analysis, summary statistics per domain were calculated (table 4.1 and annex 5-2). We tabulated the total area covered, the human and livestock population and the share of the area protected and the share under rangeland. We further characterized the domains in terms of a combined climatic index, the length of growing period, as another indicator for land suitability. The length of growing period (LGP) at any location is an important indicator of the yield potential of that location and determines the suitability of contrasting management practices and maturity length crop types and cultivars. The LGP is defined as the number of days in any given rainfall season when there is sufficient water stored in the soil profile to support crop growth. It can be calculated from knowledge of incoming daily rainfall, daily soil evaporative and crop transpiration demand and the ability of the soil to store water within the crop rooting zone. Another climatic

Based on these three criteria we mapped eight different DDDs (fig. 4.5):

1. LLL: remote and sparsely populated arid and semi-arid areas
2. LLH: remote but relatively densely populated arid and semi-arid areas
3. LHL: well-connected but sparsely populated arid and semi-arid areas
4. LHH: well-connected and relatively densely populated arid and semi-arid areas
5. HLL: remote and sparsely populated dry sub-humid areas
6. HLH: remote but relatively densely populated dry sub-humid areas
7. HHL: well-connected but sparsely populated dry sub-humid areas
8. HHH: well-connected and relatively densely populated dry sub-humid areas



**Figure 4.5:** The spatial delineation in the drylands of the ASARECA region.

constraint in the drylands is the rainfall variability. We therefore calculated the average coefficient of variation for each of the domains. Also the main soil constraints are reported per domain.

Use was made of the fertility capacity classification from HarvestChoice (Ahamed *et al.*, 2010) based on the methodology of Sanchez *et al.*, (1982). Based on this dataset we report the share of the domain area facing aluminum toxicity, high leaching potential, poor drainage, low nutrient reserves and salinity. Bai *et al.*, (2008) used a time series of satellite-based vegetation indices to assess land degradation globally. We report his findings for each of the domains.

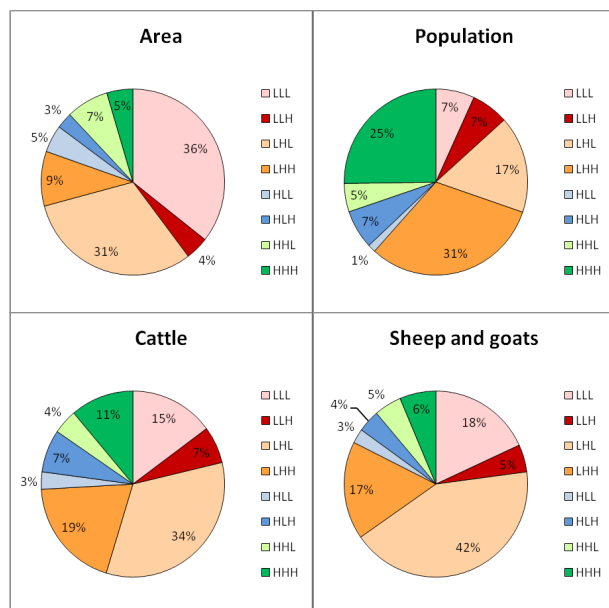
#### 4.3.2.1 LLL

This domain covers 36% of the drylands in ASARECA, making it the largest in terms of land area. About 9 million people depend for their livelihoods on this area with low agricultural potential and low market access. The population density is low with an average of 5 people per square kilometer. It is the largest domain in Ethiopia and Eritrea and second in Kenya and Sudan.

With almost 90% under rangelands, this is a typical pastoral livelihood zone. The potential for agriculture is relatively low, with a short growing season, very high rainfall variability and a lot of soil constraints. A relatively small portion of the land area has been estimated to be degraded. This is the domain with the highest mammal biodiversity and depending on the local circumstances there is quite a bit of potential for diversification through natural products, carbon sequestration, wildlife tourism and community-based conservancies. At the same time, there is potential to enhance the pastoral livestock production through increased market participation and appropriate safety net strategies. It will be important to ensure access to feed and water through mobility or alternative smart investments.

**Table 4.1. Summary statistics for the ASARECA DDDs**

	LLL	LLH	LHL	LHH	HLL	HLH	HHL	HHH
Area (million km <sup>2</sup> )	1.75	0.20	1.53	0.47	0.23	0.14	0.37	0.23
Human population (million)	9.02	8.68	22.38	41.60	1.86	8.95	6.54	33.42
Population density	5	43	15	89	8	65	18	148
% area protected	9%	9%	6%	3%	18%	17%	11%	8%
% area under rangeland	88%	37%	73%	37%	73%	0.1%	76%	0%
Cattle (LU)	5.99	2.61	13.51	7.83	1.21	3.00	1.73	4.51
Cattle density	3	13	9	17	5	22	5	20
Shoats (LU)	1.92	0.51	4.49	1.80	0.27	0.41	0.51	0.68
Shoat density	1	3	3	4	1	3	1	3
% area degraded	13%	32%	23%	34%	52%	57%	57%	63%
Rainfall variability (CV)	57	33	42	35	24	23	24	22
Average LGP 2000	58	106	87	99	177	184	181	197
Average LGP 2030	61	107	89	101	177	182	180	196
% area with aluminum toxicity	1%	3%	4%	8%	30%	17%	42%	33%
% area with high leaching potential	5%	2%	8%	9%	7%	7%	9%	13%
% area with poorly drained soils	2%	1%	4%	1%	4%	2%	3%	3%
% area with low nutrient reserves	25%	4%	21%	19%	19%	13%	21%	25%
% area with saline soils	5%	4%	3%	3%	0%	0%	0%	1%



**Figure 4.6: Comparative area of each DDD and proportion of population and livestock hosted in them.**

#### 4.3.2.2. LLH

This domain differs from the previous one in terms of population density. Although both the agricultural potential and the connectivity to markets are low, we find a relatively high population density here. The densely populated remote arid to semi-arid domain are relatively small areas (with an exception of the 114,000 square kilometer in Ethiopia) supporting about the same population as the LLL domain. With only 37% of the total land area under rangeland a considerable portion of the population is engaging in non-pastoral livelihood activities, with cattle becoming relatively more important than goats as compared to the low density remote (semi-)arid regions.

A lot of variation can be seen between countries. The LLH domain in Kenya, Ethiopia -and especially Eritrea and Sudan- faces much shorter growing periods and higher rainfall variability than the same domain in the rest of the ASARECA region. Respectively 47, 26, 81 and 69% of the land area is under rangeland. The LLH domain in Uganda, DRC and Tanzania on the other hand seems to be endowed with a slightly longer growing season and has hardly any rangeland left. Remote Sensing assessments, however, estimate rather high degradation rates in the LLH domains in these countries.

The relatively high population in this domain clearly puts pressure on the traditional pastoral livelihood strategy, but the associated high labour availability could be taken as opportunity.

#### **4.3.2.3. LHL**

The third domain in the arid/semi-arid region is characterized by relatively short travel times to the markets but low population density. It covers a vast land area and is home to more than 22 million people. Three quarter of the area is under rangeland. It is a very important livestock production zone. More than one third of the dryland cattle and more than 40% of the dryland shoats can be found in this zone. The land degradation rate is estimated to be slightly higher than in the LLL domain, but still far below the dryland average. This domain is of particular importance in the drylands of Madagascar, where it covers the largest land area and supports the highest population, and Sudan, with more than a million square kilometers and 15 million people.

Due to aridity, short growing season and high variability, this is another domain with low potential for cropping. With its relative proximity to the markets, the potential for increased market integration of the pastoral livestock production is, however, evident. Coupled with maintaining mobility and well-functioning safety nets, the livestock production can be increased. There is equally an opportunity for the pastoral livelihoods to be complemented /diversified with some other market-oriented activities, such as small trade, collection of natural products, etc.

#### **4.3.2.4. LHH**

The last of the domains in the arid and sub-arid region is the one with good market access and high population density. Almost one third of the dryland population in ASARECA lives in this DDD, while it's covering less than ten percent of the land area. This is an area where, due to the high population pressure, high-risk cropping/marginal agriculture is practiced by many. Similar to the LLH domain, only 37% of the area is under rangelands.

It is only in Sudan, Madagascar and Eritrea that about half of this domain is under pasture. In Ethiopia and Kenya this share goes down to a quarter and one fifth respectively. In DRC, Uganda and Tanzania hardly any rangeland can be found in this DDD.

Livestock densities are the highest from the arid/semi-arid domains. Small ruminant density is the highest of all DDDs, suggesting quite high crop-livestock integration. Due to the proximity to the markets and good labour availability, diversification and a move away from livestock keeping for some portion of the population is indeed feasible.

#### **4.3.2.5. HLL**

This is the first of the dry sub-humid domains. The growing season is a bit longer and the rainfall variability a bit lower than in the arid/semi-arid DDDs. This remote and sparsely populated domain is small in area and even less important in terms of population, both human and livestock. Almost one third of the land area is under rangeland. It is also the domain with the largest share delineated as national park or reserve. It is no surprise to find high mammal diversity in this area. With targeted investments and market support, there is huge potential to enhance the livestock production in this domain. There is also potential for large-scale agriculture but the trade-offs in terms of loss of biodiversity, soil degradation, soil carbon loss, loss of key dry season pasture and the negative effects on livestock production in the wider area will have to be taken into account.

#### **4.3.2.6. HLH**

The smallest of the DDDs, the HLH domain is home to almost 9 million people. With 17% of its area protected and still an average population density of 65 per square kilometer, this is a domain in which hardly any rangeland can be found. It is the domain with the highest livestock density, but also quite large degraded areas. Diversification and exit are the most obvious strategies here. While infrastructural investments and market support are crucial for any kind of development in the HLH domain.

#### **4.3.2.7. HHL**

The third domain in the dry sub-humid area is the well-connected but sparsely populated domain. More than three quarters of this DDD is under rangeland and more than 10 percent is national park or reserve.

The area is relatively accessible and there is good potential for increased market integration of the pastoral livestock production. There is also an opportunity for the pastoral livelihoods to be complemented /diversified with some other market-

oriented activities, such as small-scale as well as large-scale cropping, small trade, collection of natural products, etc. Again, trade-offs between the different strategies are important to keep in mind.

#### **4.3.2.8. HHH**

The HHH domain covers only five percent of the ASARECA drylands but supports one quarter of its population. At almost 150 people per square kilometer, the population density is by far the highest of the DDDs and rangelands are virtually non-existing. It is the domain with the longest growing season but also the most wide-spread degradation. With its relatively good agricultural potential, proximity to the markets and labour availability there is good potential for livelihood diversification and commercialization.

### **4.4 Supporting pastoralism and biodiversity**

Policy has critical implications for the use and management of the rangelands. Policies can either support or constrain the interaction between pastoralism and biodiversity conservation. The policy environment in Eastern and Central Africa has tended to be inappropriate for the proper functioning of the positive relationship between pastoralism and biodiversity conservation. Numerous policies exist but are often un-coordinated even within sectors and fall short on their evidence-base (Chabari 2009). Where policies exist, they have tended to promote biodiversity conservation at the expense of pastoralism, but for the most part, policies either do not exist or where they exist, are not implemented (Hesse and Odhiambo 2009).

Policies that support biodiversity investments will reflect more accurately the diverse livelihood portfolios of the region's pastoralists. This will be instrumental to preventing over-reliance on one or other economic activity, and thereby will assist pastoralists to manage risk and to constrict more resilient livelihoods. Policy support for a wider range of livelihood options will also help overcome the growing reliance on a narrow range of resources and thereby mitigate over-exploitation of those resources. In both cases, policy frameworks are only part of the solution and it is recognized that further attention is also required to issues of natural resource ownership and control, governance, equity, and empowerment.

Depending on a location's position along the aridity, population density or market access gradient, supporting "pastoralism and biodiversity" as a package necessitates different investment and development actions and policy support.

#### **4.4.1 Aridity**

It is the mobility and flexibility of pastoral production systems that enables them to make the best use of the patchy and fragile environments that prevail in drylands (Nori 2007). This is explained by the landscape-scale management of pastoralism, for which cultivable or irrigable patches are only one component, compared to the total dependence of crop production on those patches and the associated opportunity cost of abandoning the remaining rangelands (Behnke and Kerven 2011, Niemi and Manyindo 2010). To ensure their resilience, integrity and sustainable management, rangeland ecosystems need to be managed at the ecosystem scale. Frequently this does not happen and rangelands become fragmented, disconnected and poorly managed. If the policy objective is to support "pastoralism and biodiversity", pastoral mobility needs to be enabled and integrated landscape-scale management strengthened. Table 4.2 below lists some of the investments and policies required in the more humid as well as arid environments.

It is assumed that crop cultivation in dry sub humid areas is to some extent inevitable. The nature of cultivation should however not be to the detriment of "pastoralism and biodiversity". Where crop cultivation is practiced, close integration with livestock keeping should be promoted, through for example fodder production, ensuring access to water resources and seasonal forage and the regulation of transhumance. Further, the soils of a rangeland get easily exhausted and therefore must rely on fertilizer supplements to support continuous crop production (Okello and Grasty 2009). Supporting investments and policies need to be put in place to avoid abandonment of agricultural fields, and the consequent degradation that may take long to restore. To reduce the human-wildlife conflict it might be necessary to compensate for wildlife damage.


At the drier end of the spectrum, the focus is on increasing resilience, through risk management, diversification of the pastoral livelihoods and holistic natural resource management.

#### **4.4.2 Population Density**

Moving along the continuum from low to high population density the emphasis on each of the investments or policies that we highlight in table 4.3 should gradually increase or decrease.

As population density increases, greater emphasis is needed on diversifying the economy into non-natural resource based activities. The urban economy needs

**Table 4.2: Investments and policies required along the aridity continuum.**

<i>Dry sub-humid</i>	 <i>Continuum</i>	<i>Arid or semi-arid</i>
<ul style="list-style-type: none"> <li>• Protect access to communal resources (water and seasonal forage for wildlife and livestock)</li> <li>• Ensure effective regulation of transhumance</li> <li>• Compensation for wildlife damage</li> <li>• Focus on diversification strategies to protect biodiversity</li> <li>• Promote crop-livestock systems</li> <li>• Promote crops that complement “pastoralism and biodiversity”</li> </ul>		<ul style="list-style-type: none"> <li>• Enable livestock mobility to maintain livestock-biodiversity corridors</li> <li>• Strengthen communal resource management</li> <li>• Focus on diversification to promote resilience</li> <li>• Develop integrated pasture-water monitoring and management systems and institutions</li> <li>• Provide infrastructure for integrated rangeland-water management</li> <li>• Risk management and safety nets (e.g. insurance)</li> </ul>


to be strengthened, so that a section of the population can successfully exit out of pastoralism. Access to credit and education complemented by infrastructural investments are needed for this. As permanent settlements appear and continue to grow, there is a need to ensure mobility and connectivity to key natural resources. Strengthening the urban economy needs to go hand in hand with regional planning so that the rural development is not compromised. There is an urgent need to plan and guide this currently spontaneous and uncontrolled process of pastoral urbanization (Little *et al.*, 2008). High population density typically puts high pressure on bio-diversity. The delineation and protection of conservation areas can contribute to the protection of biodiversity and ecological functioning.

#### 4.4.3 Market access

Poor infrastructure, and insecurity, increases the costs and risks of livestock trading in remote areas (Barrett 2001, Little 2000). While the proximity to markets increases the number and range of options open to those interested in livelihood diversification. Evidently, there are different market challenges to address for people living closer to markets. It is for example important to put policies and institutions in place that remove “anti-competitive” bottlenecks, such as market exclusions and distortions by trader cartels (Barrett *et al.*, 2004).

At greater distance from the marketplace, pastoralists are less able to dictate or respond to terms of trade and are less able to sell little-and-often. This creates

**Table 4.3: Investments and policies required along the population density continuum.**

<i>Low population density</i>	 <i>Continuum</i>	<i>High population density</i>
<ul style="list-style-type: none"> <li>• Strengthening of the pastoral economy</li> <li>• Social services (including security)</li> <li>• Infrastructure</li> <li>• Diversify to include biodiversity-related investments</li> </ul>		<ul style="list-style-type: none"> <li>• Strengthen land rights and NR governance against encroachment, fragmentation and resource pressures</li> <li>• Protect biodiversity</li> <li>• Rangeland rehabilitation</li> <li>• Diversify the economy through greater commercialisation and non- NR investments</li> <li>• Urban investments</li> </ul>



liquidity issues, which are compounded by the inability to sell when prices are high and save for a later date (Davies 2006). Hence tailor-made pastoral banking has particular pertinence, allowing pastoralists to take advantage of the high production in the good years and buffer against losses in the bad years. These services should recognise cultural and informational constraints. In addition to providing bank services, public investments in roads and infrastructure, household level processing and collective marketing can help to overcome some of the difficulties in accessing the markets. The transaction costs associated with distance from markets and the need to sell in bulk could be a disincentive to diversification: the more economic activities that are engaged in, the greater the cumulative transaction costs. Hence it may make sense to invest in specialist pastoral production. When their herd size demands it, pastoralists can then move further from markets and access higher quality but distant pastures.

Table 4.4 below summarizes the investments and policies required if the policy objective is to support “pastoralism and biodiversity” along the market access continuum.

#### 4.4.4 Cross-cutting issues

Clearly, some investments are not strictly a priority in only one development domain. Across all domains action against pastoral poverty and marginalisation is crucial. There is need for investment across the board, particularly in education, health services, local institutions, security and legal services.

Infrastructure development of roads, schools, hospitals, industries, and market centres has been neglected in the drylands (IFAD 2000). Core physical infrastructure comprising roads, transport systems, communications, financial services, energy and water supply, housing, environmental conservation structures, including parks and forestry can play an important role in promoting economic growth and encouraging private investment in the drylands (Mortimore 2005). In dryland areas, this infrastructure can contribute significantly to sustainable development and sustainable management of natural resources (Mortimore 2005).

Rangeland productivity is an issue in all development domains and there is need for broad based improvement in rangeland restoration, management of bush encroachment, fire management and management of invasive species. Across the board there is need for investment in integrating crop-livestock systems and ensuring that all agricultural planning is based on recognition of the value in integrating production.

Women’s rights and responsibilities have not been reflected above as they arise in every development domain, but in each domain they require different investments and policies than men. The investments and policies to support women’s roles and responsibilities in “pastoralism and biodiversity” might also differ between development domains.

**Table 4.4: Investments and policies required along the distance to the market continuum.**

<i>Far from markets</i>	<b>← Continuum →</b>	<i>Close to markets</i>
<ul style="list-style-type: none"> <li>• Strengthen market chain connectivity</li> <li>• Collective marketing</li> <li>• Recognise opportunities for trans-boundary trade</li> <li>• Infrastructure</li> <li>• Market information</li> <li>• Exploit the economy of scale in marketing</li> <li>• Address asset liquidity and relate to banking services</li> <li>• Invest in processing or transport of perishable products (esp. milk)</li> </ul>		<ul style="list-style-type: none"> <li>• Diversification of production (both in pastoralism and into non-pastoral activities)</li> <li>• Private rather than collective market-enterprise</li> <li>• Legislation to promote competition (e.g. avoid cartels)</li> </ul>

## 4.5 Discussion

An optimized overall use of the dryland areas in Eastern Africa necessitates careful regional land use planning, taking into consideration trade-offs at the landscape scale. The concept of development domains can help planners and decision makers thinking through the nature of investments and supporting policies needed when evaluating the wide variety of available livelihood options and land use systems. The differences along different axes favour certain investment options and define policy constraints that need to be addressed. However, care has to be taken when using the information and maps presented in this chapter. The accuracy and scale of the data make it useful for planning at a regional level only. As more detailed information is collected, the same concept can be applied at different scales and could be built into a decision support tool for district planners.

The delineation of dryland development domains on the basis three dimensions or criteria and classified in two classes (low and high) according to hard thresholds presents a huge simplification of reality and has also a couple of inherent limitations.

- a. A key concept of the domain approach is the choice of a limited number of factors assumed to affect potential strategies. In reality many different factors have an influence. The introduction of another criterion could possibly bring out other important aspects. We felt, for example, that an additional criterion on biodiversity would have been useful, but not practical. Species density may increase with humidity, but species endemism may increase with aridity, whilst plant and animal species diversity is not so linear and species market value may increase with aridity (e.g. pharmaceutical properties).
- b. The development domains approach is only providing a first strategic filter defining overall priorities and challenges. When zooming in or planning specific interventions, other factors might have to be taken into account. "Pastoralism and biodiversity", for example, is an agro-ecosystem that requires system-based holistic planning. In all domains there must be emphasis on landscape-scale land use planning that transcends the domain. The domain tool can help to keep track of the issues that play along the three dimensional aridity, market access and population density continuum.

- c. Each of the criteria exists in reality along a continuum, ranging all the way from low to high. Opportunities and investment needs gradually change along this continuum. Furthermore, these variables are not static, but are changing over time. Climate change is likely to impact on aridity and production potential, population is growing drastically across the region and urbanization is rampant.
- d. The three dimensions are not independent, but exhibit quite high correlation (table 4.5) with each other. Also other dimensions and phenomena are correlated. For example, type of land use is heavily influenced by ethnicity, as is access to markets, public investment and political representation. There is a similar correlation between ethnicity, population density and aridity. Similarly, there is a major correlation between type of livestock, population density (and ethnicity), market access and aridity. This has important implications for investments.

For each of the domains, the future of the drylands will in the end largely depend on the development paradigms, we as a society, decide to follow. For example, there is an ongoing debate as to what are the best ways of ensuring sustainable food production for the growing population (Herrero *et al.*, 2010). Two big questions prevail: (i) Will investments be directed to pastoralist areas? (Fan and Hazell 2001, Herrero *et al.*, 2010) and (ii) Will there be breakthroughs in payment schemes for ecosystems services in these areas? (Reid *et al.*, 2004). The answers to these questions together with global trade and power relationships will have significant impacts on how some of these regions will develop. Investments in infrastructure (roads, hospitals, schools, post-harvest facilities, markets) could provide the necessary conditions and incentives for producing and storing food in a sustainable way in an equitable way for most pastoralists. High public investment produces improved services for people and develops markets, making people less vulnerable in the short term. However in the long term productivity might

**Table 4.5. Correlation coefficients between aridity, market access and population density**

	AI	MA	PD
Aridity Index (AI)	1	-.057**	.039**
Market Access (MA)	-.057**	1	-.036**
Population Density (PD)	.039**	-.036**	1

decrease as pastoralists degrade the landscape while trying to produce more meat and milk due to the existence of adequate market infrastructure. Investors might come and buy large areas of land that can be put into production at the expense of biodiversity. This could in turn result in more vulnerable and dependent communities and cultural erosion. Land degradation and biodiversity loss might be significant. If at the same time, payments for ecosystems services could be put in place both for carbon, wildlife and the protection of water sources, pastoralists could manage livestock populations not to maximise animal numbers but to manage the whole ecosystem for high carbon accretion. Sales of livestock plus payments for ecosystems services could then stabilise income sources and more children can attend school. At the same time families could become

food secure and less vulnerable. Care needs to be taken that these payment schemes don't lead to inequity as it is only the well-educated or more resourceful who have the information to access payments for ecosystems services. Absentee owners of large farms could benefit significantly from the payments while the local community remains marginalised.

This last issue also brings out the need to include communities in the planning. Pastoralism and pastoral lifestyles are unique and tailored to inhabit and use the drylands as efficient as possible, through use of traditional knowledge system and cultures. This resilient and adaptive knowledge of the pastoral people should be incorporated in the national policies and strategies where appropriate.



# Chapter 5: Policies and policy change

## 5.1 Introduction

Policies, legal and institutional frameworks are core pillars of any conservation, natural resource management as well as development work at all societal levels. They define the relationships between people and resources and guide the interactions that ensue from such relationships for sustainability, growth and harmonious coexistence. In appreciation of the role policy and laws play in biodiversity conservation and drylands development in Eastern Africa, we reviewed the regional and country policy contexts with a bearing on biodiversity conservation, pastoralism and drylands development. The following are the objectives that informed the review which focused on Eastern Africa, specifically Kenya, Tanzania and Ethiopia at country levels:

- To deepen understanding of the policy context for the interaction between biodiversity conservation and pastoralism in the three countries in terms of:
  - a. What policies exist that have a bearing (negative or positive) on this interaction
  - b. What the key provisions of those policies are
  - c. The extent to which they are implemented on the ground and the impacts thereof;
  - d. Challenges associated with policy formulation and implementation with regards to the interaction between biodiversity conservation and pastoralism
  - e. Transboundary or regional dimensions of the policies and challenges

In this chapter, we present a simplified summary of the analysis of some of the extant policies at global, regional and national levels in the Eastern Africa with a bearing on pastoral livelihoods and its interaction with biodiversity conservation and drylands development. From this analysis, attempts are made to look at the impact of the policies and laws on the interaction between pastoralism, biodiversity conservation and drylands development.

Consequent to the impact analysis, attempt is made to generate policy options that will ensure and secure positive interaction between pastoralism, biodiversity

conservation and drylands development. In the policy review, impact analysis and the generation of policy options, special attention has been given to the role of traditional knowledge in terms of integration and how it can be used to enhance biodiversity conservation and accelerate development in the drylands.

This chapter is organized into four components. The first section deals with the reflection on Eastern Africa drylands development and the significance of pastoralism to the drylands. The second, review of the extant policies with regard to the key provisions with a bearing to pastoralism, biodiversity conservation and drylands development. The review consolidates the global, regional and country policies. It also discusses the policies with greater emphasis on land, water, agriculture, forest, wildlife, environment and main economic policies with respect to pastoralism, biodiversity conservation and drylands development. The third section addresses the key issues in pastoralism, biodiversity and drylands development with an aim of providing key factors or consideration in improving the interaction between pastoralism and biodiversity conservation in the context of drylands development. The chapter concludes with key policy recommendations

## 5.2 Background: The trends in dryland development in the Eastern Africa

The discourse on drylands development in the Eastern Africa is vibrant and dynamic. In the pre-independence era, the colonial governments did not think much of them. The post independence governments have struggled and experimented with diverse dryland development models but with little success. Little attention and investment have gone to drylands development in terms of human and physical infrastructural development. After years of neglect informed by the perception that drylands are low potential areas, tantamount to waste lands, the discourse and attention to drylands development has been improving steadily. In Kenya, though the initial government policies and laws developed soon after independence appreciated the need for biodiversity conservation and sustainable management of natural resources, the provisions on the dryland was negative as exemplified in Sessional Paper no. 10 of 1965, which

provided that investment shall be directed to high potential areas and the proceeds arising thereafter shall be invested in the low potential areas. In Ethiopia and Tanzania, the investments on drylands have equally followed this trend.

The complexity in drylands development in the region seems to arise from the fact they are not suitable for rain fed agriculture yet the countries rely heavily on the rain fed agriculture. The agrarian approaches of technocrats manning the policy discourse within the government planning processes and resource allocation have further reinforced this notion. The dominant livelihood in these areas also does not sit well with the countries' policies on settlement and service provision. Pastoralism is the predominant livelihood in the drylands (arid and semi-arid lands) in the region. Due to its extensive nature and mobility in search of pastures, water and other resources like salt licks, governments find it problematic providing pastoralists with basic services. Often, they are viewed as hostile, prone to conflicts and as such governments use these perceptions to justify why pastoralists need to settle. Pastoralists in the three countries also occupy the extreme ends of the countries sometimes transcending international border. The geographical distance between the pastoral areas and the

centers of power seems to be working against pastoralists in terms of visibility and government attention within the mainstream or core of development.

Inadequate disaggregated data on drylands productivity hides its significance. Looking at figure 4.1, a clear synopsis of the significance of drylands is shown. To take advantages of the opportunities in the drylands, the policy and institutional framework need to promote synergy and value addition in utilization of dryland resources. The policies should focus on improving access to resources (natural, financial, social, physical and human). In the past, government policies and other stakeholders' practices did not reflect the importance of drylands. The decrees and administrative decisions and proclamations made by the colonial governments in Kenya and Tanzania laid the foundation for radical changes in approach to drylands development.

The perception of drylands as free and unoccupied land informed the development of policies that promoted the alienation of pastoral lands that were hitherto used for seasonal grazing. The customary land and resource tenure that was governing the access, use, control and management of common resources were disregarded. This was the beginning of watering down the significance of traditional

#### **Box 5.1: Brief on the historical context of the drylands development.**

The impact of the policies (including administrative proclamations) on the development of Kenya's drylands commonly referred to as ASALs can be traced back to colonial periods. Through the Britain's Foreign Jurisdiction Act of 1890, the colonial government imposed Land Title Ordinance in 1899. The ordinance gave the imperial power for the disposal of what was considered waste and unoccupied land in the protectorate. This opened ways for the appropriation of the pastoral land. The 1904 and 1911 Maasai land agreements were driven by the mentality that pastoral lands were unoccupied lands. Further proclamations on land administration and management weakened the communal tenure and started the process of disintegrating the traditional institutions that were responsible for land and natural resource management. The colonial government laid emphasis on agriculture.

In Tanzania the conflict of conservation and drylands development started with the Germans in 1884. During the German's reign in Tanzania, several large reserves were made where animal density was high and human population was low. This was done on the assumption that the land was empty and free. The German colonialists failed to understand that the local pastoralists depended for their livelihoods on the land that was being set aside for reserves. This was followed by the Colonial Land Commission which claimed the land through the 1895 Crown Land Ordinance and later the Forest Protection Ordinance. Under the colonial conservation, the collection of fuel became wood-theft, the hunting of animals became poaching and pasturing cattle became grazing trespass. These laws alienated indigenous people from their land and resources and criminalized traditional practices such as maintenance burning and firewood collection. (adopted from Goldstein, Gregg: Legal System and Wildlife Conservation: History and Law's Effect on Indigenous People and Community Conservation in Tanzania at [http://findarticles.com/p/articles/mi\\_qa3970/is\\_200504/ai\\_n13643933/pg\\_8/?tag=mantle\\_skin;content](http://findarticles.com/p/articles/mi_qa3970/is_200504/ai_n13643933/pg_8/?tag=mantle_skin;content))

In Ethiopia, pastoralism has all along been considered to be a primitive and nonviable way of life: to be avoided rather than developed (in Hundie and Padmanabhan 2008). Meanwhile colonial powers along the country's borders established artificial boundaries that divided the grazing lands of the pastoral peoples living there and restricted movements. At the same time customary institutions that would have normally controlled such as traditional raiding practices were undermined, leading to increasingly violent, politicized and commercialized

Raiding (aided by the increasing availability of small arms) (Siefulaziz 2004).

The 1955 Revised Ethiopian Constitution determined that pastoral territory referred to as *zelan* land (*zelan* is now considered to be a derogatory term for a nomad), was state property (Yacob Arsano 2000). The Derg from 1974 also took this approach, and when lands were nationalized pastoral land was redefined as tribal grazing areas or reserves. At times the administration of these areas was heavy handed with restrictions placed on movement across regional and international borders and forced sedentarization (Helland 2006).

institutions and customs in resource management in the drylands. It is this thinking that continued and was heavily reflected in the formal laws and policies after independence, giving the customary law a low status in the justice system.

Restriction of mobility, fencing off parcels of land and allocating both wet and dry season grazing lands for other uses without effective consultation with the communities have impacted negatively on the access to critical resources for livestock and people. The end result has been environmental degradation and intensification of conflicts.

With the increasing population pressure, climate change challenges and the need to boost economic productivity and growth and vastness of drylands, attention is slowly but increasingly shifting to drylands for solutions. Other communities are moving into drylands as an alternative from highly fragmented and subdivided lands in the high agricultural potential areas.

Governments are now forced to look afresh at the drylands. There is renewed push for increased investment in these lands. The three main economic policies of Kenya, Tanzania and Ethiopia attest to this. Kenya and Ethiopia have established institutional frameworks at the executive and parliamentary level respectively to push for a well-coordinated development in the drylands. Kenya has the Ministry of State for the Development of Northern Kenya and other Arid Lands. Ethiopia has a Standing Committee on Pastoral Affairs in parliament. Though these steps are laudable, it is unfortunate that the governments are yet to give full total commitment in support of pastoralism. The governments hope that in the long term, the pastoralists will settle and pastoralism will cease to exist. The desire to get pastoralists settle is driven by inadequate understanding of the importance of pastoralism in making drylands productive and the role it plays on biodiversity conservation. Currently, there is a substantive push for irrigation agriculture in the drylands of Kenya and Ethiopia. While livelihood diversification is critical and necessary for sustainable development in these areas, it should be based on the building of capacities and provision of opportunities such that there are opportunities for making rational choices.

Regionally, the policy framework has improved a lot. In the last two to three years, major regional processes on land, pastoralism and livestock development have opened up new opportunities for drylands development. The AU Land Policy Framework, The AU Pastoralism Policy and the IGAD Livestock Policy Initiative and COMESA Policy Framework on Food Security in Pastoral areas advocacy cross border movement for Livestock Marketing and Resource use are regional instruments with substantial opportunities to develop the drylands and the pastoral livelihoods. These

frameworks are committing governments to address the underlying issues in land, pastoralism and livestock development in a way that secures the rights of the poor and the vulnerable in the society. They emphasize the integration of indigenous knowledge in managing drylands and pastoral areas as well as in developing livestock sector.

In terms of biodiversity conservation, the role of pastoralism cannot be gainsaid. This is because pastoral areas or ASALS are inhibited by rich diversity of flora and fauna that are adapted to the conditions. The plants, which constitute pasture, are the main feed for pastoral herds. In terms of wild animals, most of the pastoral communities don't eat wild game and there is no competition between the herds and the wild animals as they feed on different plant species at different levels. The livestock help in the regeneration of pastures (plants) providing feed to the wild animals.

## 5.3 Country Situations

### 5.3.1 Kenya

After independence, Kenya pursued an "industrialization first" development policy as the engine for economic growth<sup>7</sup>. In this process, together with other reasons livestock development was given a back seat. Drylands were neglected, still being seen as waste lands, investment priorities were given to high potential areas as was stipulated in Sessional paper no. 10 of 1965.

Attempts were made to provide livestock extension services under the Range Management Division of the Ministry of Livestock Development; however, this was overtaken by the misconception of "**The Tragedy of Commons**" which presented the colonial view of pastoralists as irrational land and natural resource managers. The enactment of the Land (Group Representatives) Act 1968 further reinforced the perceptions advocated under the Tragedy of Commons as it represented a new approach to pastoral development and was a first attempt by the Government to radically transform a nomadic subsistence production system into a sedentary, commercially oriented system. It called for major changes in pastoral social and political organization and livestock management strategies.

The policy environment touching on pastoralism, biodiversity and drylands development have greatly improved since late 1990s. Pastoralism began to be recognized as a livelihood system in almost all the policy documents. There is increased attention and investment

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<sup>7</sup> John Omiti and Patrick Irungu. IPAR Discussion Paper No. 031/2002. Institutional and Policy Issues Relevant to Pastoral Development in Kenya. ISBN 9966-948-14-7.

in the pastoral areas. The establishment of the Ministry of State for the Development of Northern Kenya and Other Arid Lands testifies to this. The ministry is a coordinating ministry thus should liaise with all government ministries and departments to have faster and effective service delivery. Even though the ministry was established as a coordinating ministry, it doesn't have the legal mandate as all ministries are equal and thus must rely on the good will of other ministries to perform.

Since 1999, the ASALs have attracted sufficient attention from the government when a Pastoral Thematic Group was established under the Arid lands Resource Management Project. For the first time positive policy statements recognizing pastoralism as a viable livelihood system were included in the Poverty Reduction Strategy Paper (PRSP) In the Economic Recovery Strategy Paper developed in 2003, a whole chapter was dedicated to drylands development. Even though the government did not proceed to allocate the 10 billion that was required, the policy recognition was a great step forward. During the development of Vision 2030, the drylands development was not effectively captured. This led to the review of the document the development of an annex to Vision 2030 detailing what is required for pastoral and drylands development. Arid and Semi Arid Lands (ASALs) Policy has also been developed and is awaiting parliamentary approval. The paper sailed through the cabinet and is expected to go through parliament smoothly.

The critical challenge for Kenya is to develop the capacity of local communities to be able to take advantage of the opportunities that come with increased investment. Investing on community capacity development will also help in ensuring effective governance and productivity of counties, effective participation in biodiversity conservation through diverse ecotourism and the likes. Another big challenge in government is lack of political will in implementing certain policies that are expected to provide opportunities for pastoralist to benefit and manage natural resources because of vested interest from the policy makers. The land policy is a case in point which remains unimplemented because of vested interest from the policy discourse. This equally applies to the Wildlife policy which stalled in the second stage of its formulation because of big investors and international donors who have laid interest in its implementation.

### 5.3.2 Ethiopia

The government of Ethiopia recognizes pastoralists and pastoralism. The government is however concerned with the continued vulnerability and is thus seeking to settle pastoralists. It is hoped that after settlement, it will be

easy to provide the pastoralists with basic services, it will be easy to provide them with education and have them involved more in agricultural production. To achieve the long term goal of settling pastoralists, the government is giving the pastoralists land along the river banks and encouraging them to settle.

Another key feature in Ethiopia is the increasing alienation of pastoral land for commercial agricultural production. The regional governments are leasing out large chunks of land in Ethiopia's drylands to the multinational for commercial agriculture. This is affecting the pastoral production. The move to promote irrigation agriculture among the pastoral communities without building their capacities on sustainable agricultural practices may eventually prove counterproductive.

The government has also developed mixed messages concerning development in pastoral areas. On the one hand the government highlights the contribution of pastoralism to livestock production, identifying it as an area for further economic growth and on the other saying that it anticipates all pastoralists will be settled. The five year growth and transformation plan (2005/06 – 2009/10) focuses on livestock development, water provision, forage, development, irrigation and marketing but important factors such as securing access to land and resources are not mentioned.

The decreasing space for policy dialogue between the government and other stakeholders is another challenge facing pastoralists in relation to resource access, control and utilization. The introduction of the civil society law that vests authority on some aspects of dialogue on the government means that space has been reduced for negotiations particularly where resource access use and conservation dialogue is required

### 5.3.3 Tanzania

Tanzania like Ethiopia is pursuing the long term strategy of sedentarizing pastoralists so that the livestock sector can be modernized. The government is keen on ending mobility as it is viewed as a source of conflict with other settled communities. Though in some policies they are recognized like in MKUKUTA, in policies like the Livestock policy, pastoralists are viewed as a problem with regard to environmental degradation. The livestock policy clearly states that free movement of pastoralists and nomadism is to be prohibited. The alternative that it provides are incentives on proper pastoral land stewardship and modern transhumance pastoralism likened to the ranch model without mentioning that the government ranching scheme has been a total failure and these lands



are now in the hands of only a few individuals and have not benefitted a bigger audience like pastoralists. The negative perceptions against pastoralism are so strong in Tanzania. For instance, in Strategy for the Implementation of Land Laws (SPILL) strong sentiments are raised against pastoralism and mobility. Closer looks of such sentiments indicate they are more of perceptions than realities when a pastoral production system is understood in its totality. The Natural resources policy and Tanzania Investment Act 1997 are also some of the policies that undermine pastoral production and access of pastoralists to biodiversity and natural resources. The two have been mentioned as the cause of conflict between government and pastoralists in areas rich in biodiversity conservation like Ngorongoro, Tarangire, Ihefu and Mkomazi. The recent instances of pastoralist evictions from these areas have been associated with these policies in how they define access, use and control by the different user groups.

The importance of pastoralism in making drylands productive can no longer be wished away. Studies are awash with evidence on the economics of pastoralism. The pastoral discourse has shifted significantly.

The gist is now on how to capture the pastoral and drylands contribution to the national economies through well documented accurate disaggregated data.

In Kenya, out of the agricultural sector 16% contribution to the national GDP, the livestock sector contributes 50% (Hesse and MacGregor 2006,). Within the national herd, indigenous cattle account for about 75% and these are associated with pastoralists. In Ethiopia, it is averaged that livestock contribute about 40% of the agricultural GDP and more than 20% of the total GDP (HPG Synthesis paper, April 2009: Social Protection in pastoral areas). The situation is the same in Tanzania where livestock provides about 30% of the agricultural GDP. About 40%

of this contribution to GDP comes from beef production, 30% from milk production and the remaining 30% is from poultry and small stock production (Letara, *et al.*, 2006). The accusation against pastoralism as creating desertification and environmental degradation, managing stock according to irrational economic principles, being technically stagnant and backward and being against development do not hold. Without pastoralism, the vast drylands in the region will not put to an effective use. Conservation of biodiversity will also be compromised thus threatening the existence of a lot of plant and animal species.

The future of Eastern Africa countries lies on effective and sustainable development of the drylands. The increased investment in drylands will open up the vast areas for diverse opportunities in terms of livelihood diversification, will promote the practice of sustainable drylands livelihoods tapping into multi-billion livestock trade, and through an effective land use plan secure migratory corridors, dry seasons and wet seasons grazing land, and designate areas for irrigation agriculture and tourism. The investment in developing Eastern Africa dryland will beef up human and national security and will also contribute towards enhancing national food security and sovereignty. These are hugely dependent on policies and institutional frameworks.

## 5.4 Review of existing policies at global, regional and national level

This section provides a synopsis of the policy status with regard to pastoralism, biodiversity conservation and drylands development. The policies that are reviewed in this section are those that relate to:

- Land, natural resources and biodiversity management and conservation (Specifically policies relating to land, water, forests, wildlife, and environment

### Box 5.2: Direct and indirect values of pastoralism

Direct values	Indirect values
<p><b>Subsistence and livelihood values:</b></p> <ul style="list-style-type: none"> <li>■ milk, meat, blood, firewood, honey, fruits, medicine</li> <li>■ the herd as a form of insurance, savings and risk management</li> <li>■ sociocultural values and the development of social capital (absence of conflict)</li> </ul> <p><b>Economic values:</b></p> <ul style="list-style-type: none"> <li>■ marketed products: sales and exports of milk, livestock, hides, leather and non-timber forest products</li> <li>■ raw material production: inputs to supply chains involving informal or quasi-formal economic activity – butchers, traders, transporters</li> </ul> <p><b>Human capital values:</b></p> <ul style="list-style-type: none"> <li>■ employment of 9 to 20 million East Africans</li> <li>■ skill development and indigenous knowledge</li> </ul>	<p><b>Economic input values:</b></p> <ul style="list-style-type: none"> <li>■ added value to agricultural production</li> <li>■ benefits to tourists and the tourism industry</li> </ul> <p><b>Environmental values:</b></p> <ul style="list-style-type: none"> <li>■ nutrient recycling</li> <li>■ maintenance of pasture productivity and biodiversity</li> <li>■ tree regeneration</li> <li>■ maintenance of natural ponds and water cycling</li> <li>■ building environmental resilience to climate change</li> </ul>

- Governance and political organization (Specifically the constitutional provisions on devolution and pastoralism)
- Economic development (Specifically national development plans, agriculture and rural development and livestock development)

The review is organized in the following manner:

- Global and regional synopsis ( looking at key policy instruments from the global and regional level, with specific focus on UN, AU and EAC – although Ethiopia is not a member of the EAC, Kenya and Tanzania are, and the policies of the EAC have a direct bearing on the Serengeti Mara ecosystem considered in chapter 3)
- National synopsis covering Ethiopia, Kenya and Tanzania (with a focus on policies from the three sectors that are of relevance to the project and have a bearing on the interaction between biodiversity conservation and pastoralism)

## 5.5 Global policies

The international instruments for biodiversity conservation are sufficient in promoting conservation both within the original habitat (in situ) and outside (ex situ). The Convention on Biodiversity Conservation provides a comprehensive framework with regard to conservation of biological diversity, sustainable use of the components of biological diversity and ensuring fair and equitable sharing of benefits of biological resources. Ethiopia, Tanzania and Kenya are signatories to this convention. In terms of its implementation, the CBD has attracted donor interest and funding. Fredrick Owino in his paper: Opportunities to improve drylands management in Sub Saharan Africa: Implications of International Conventions and Agreement says this “There have been some previous initiatives in the region. These include an on-going regional project on capacity building for dryland biodiversity with its co-ordination unit at Nairobi (Kenya) with support from SIDA/SAREC, the Madagascar biodiversity programme, the FAO/UNDP/GEF East Africa Biodiversity project, IUCN Eastern Africa Biodiversity Conservation programme, FAO/GEF Biodiversity project and the Congo Basin Forest Initiative. In relative terms, this is an area which has attracted substantial donor support in the past. These previous efforts have mainly taken the form of short-term projects by regional and international NGOs with limited

### The Convention on Biodiversity Conservation

“Among the Rio Earth Summit conventions, it is perhaps the Convention on Biological Diversity (CBD) which has attracted the greatest interest and participation in Sub Sahara Africa. The CBD calls for formulation and implementation of National Biodiversity Action Plans and it has an international financial mechanism in GEF as executed by UNEP/UNDP. Currently, dryland

direct support to national institutions. A lot remains to be accomplished to mitigate the accelerating biodiversity losses in forests and relevant national institutions remain weak in their implementing capacities”.

The Convention on the Wetlands of International Importance (Ramsar Convention) is critical in establishing Ramsar sites which provide habitats for endangered species. The CITES and the Convention on the Conservation of Migratory Species and Wild Animals are also relevant to the biodiversity conservation in the drylands. This is because within the Eastern Africa, most of the wildlife are found in the drylands.

In addition to these conventions, other global instruments with a bearing to biodiversity conservation and drylands development are: Millennium Declaration which entailed the governments of the world commitment at the dawn of 21st century to eradicate poverty and promote sustainable development with clear provisions on respect for nature and prudence in the management of all living species and natural resources in accordance with principles of sustainable development, the Millennium Development Goals, Agenda 21, UN Convention to Combat

Desertification, Rio Declaration on Environment and Development and UNFCC among others. (see summary of the instruments and their provisions in the annex entitled global policies).

Drylands management and conservation has been effectively addressed in the global instruments. In Agenda 21, issues relating to this are captured in chapter 12 and 26 among others. The role of indigenous knowledge and traditional natural resource management is recognized in key global instruments

including the Convention on Biodiversity, Convention to Combat Desertification and Conventions on Climate Change (FCCC) and CITES. All these instruments emphasize participatory approaches which effectively involve the communities in the management and promoting sound environmental and sustainable development.

These instruments encourage the governments of respective nations to sign and domesticate the conventions. For implementation, it is usually expected that every country will review, develop and or abolish any law or policies that run contrary to these conventions. The challenge however has been the low levels of commitments by the governments in making funds available, building capacity and making sure that these conventions are operationalized.

**Table 5.1: Summary of the review of some of the global policies**

Policy Instrument	What it is about	Relevance	Remarks
Millennium Declaration	Commitment by government of the world at the dawn of the 21st century to eradicate poverty and promote sustainable development	Respect for nature is one of the fundamental values for international relations in the 21st century  Prudence in the management of “all living species and natural resources in accordance with precepts of sustainable development  Commitment to the full implementation of the Convention on Biological Diversity and the UN Convention to Combat Desertification	The instrument is positive on conservation and can be used to push for the implementation of other conventions.
Millennium Development Goals	Specific measurable commitments by governments to achieve certain goals regarding challenges of poverty and underdevelopment by 2015	MDG 7 commits governments to integrate principles of sustainable development into country policies and programs and to reverse loss of environmental resources	These commitments underpin government policies and strategies regarding conservation of biodiversity
Agenda 21	Comprehensive plan of action for governments and other stakeholders at local, national and global levels to promote environmental sustainability	Ch. 12 on combating desertification and drought by, among other things, promoting popular participation  Ch 15 on conservation of biological diversity by implementing the Convention on Biological Diversity  Ch. 26 on recognizing and strengthening the role of Indigenous People and their communities, including recognition of their values, traditional knowledge and resource management practices to promote environmentally sound and sustainable development	All the three countries committed themselves to Agenda 21 by their signature of Rio Declaration on Environment and Development
Rio Declaration on Env and Dev	Proclaims principles for sustainable development in the	Principle 2: states to recognize indigenous people and their communities and other local communities and promote their participation in environmental management and development to take advantage of their knowledge and traditional practices	Pastoralists have been recognized as indigenous peoples in Africa
Convention on Biol. Diversity	Global convention on conservation of biological diversity	Art 8(j) committing member states to respect, preserve and maintain knowledge, innovations and practices of indigenous and local communities relevant for conservation of biodiversity	All the three countries are signatories to this Convention
UN Convention to Combat Desertification	Global convention to address desertification especially in Africa	Art 3 provides for participation of local communities in the design and implementation of programmes to combat desertification  Art 11 calls for sub-regional and regional cooperation to design and implement transboundary projects	All the three countries are signatories to the Convention
UN Declaration on the Rights of Indigenous Peoples	Declaration adopted by the UN Gen Assembly to promote and secure the rights of indigenous peoples	Art 29 asserts the rights of IPs to the conservation and protection of the environment and the productive capacity of their land or territories and resources  Art 31 recognizes the traditional knowledge of IPs including those related to fauna and flora	Relevant to pastoralism and the indigenous knowledge of pastoralists

## 5.6 Regional Policies

Regional integration is growing and strengthening day by day. It is bringing the much needed approach in addressing transboundary natural resource management, conflict management, trade and free movement of people. The regional policies are promoting collaboration and cooperation between states in dealing with transboundary resources. Though most of the policies are positive, the implementation mechanism is generally lacking. In fact in most cases, countries sign these instruments and continue with the business as usual attitude. In most countries these regional policies have no relation with national policies. This has created rigidity in their implementation in specific member countries as they conflict with national policies and national interest. A lot of the time, implementation of is based on individual state relations and mutual benefits accruing to both member states.

In biodiversity conservation and drylands management, a regional approach is key, since ecosystems do not respect boundaries. Key natural resources like pastures, water sources and forests run across different ecosystems and countries. One of the most important regional instruments on conservation is the African Convention on the Conservation of Nature and Natural Resources. The convention promotes interstate cooperation on conservation issues. In exploiting transboundary resources, the contracting states are required to furnish the Secretariat with all the laws, administrative directives with a bearing to the convention. The convention commits the states to plan conservation, utilization and management of rangeland.

The Protocol on Environment and Natural Resources provides for cooperation in environment and natural resources management in the following areas:

- Development and implementation of sound policies and practices of environmental management and sustainable utilization of natural resources.
- Coordination of actions for the protection and conservation of environment and natural resource against all forms of degradation and pollution arising from development activities.
- Protecting of critical ecosystem of flora and fauna in the community

The protocol on Environment and Natural Resources though covering the East Africa Community members only provides a very solid and comprehensive framework for regional conservation. The protocol provides for the shared responsibility and cooperation

in the management of environment and natural resources including those that are transboundary in nature. In the article 9, dealing with the management of transboundary resources, the protocol provides that the parties will a) develop mechanism that will ensure sustainable utilization of transboundary ecosystem and b) jointly develop and adopt harmonized common policies and strategies for sustainable management of transboundary natural resources. The striking feature of the protocol is the talk on coordination and harmonization of the policies. If this approach can be adopted, the drylands mapping and planning can run across the countries and an effective and appropriate land use that soundly compliment with conservation can be worked out with the regional principles and administrative instruments for implementation.

The management of transboundary natural resources has been a regional challenge due to different country policies and legal frameworks. Without agreed upon regional frameworks, governments have found it difficult to develop instruments for these types of resource. One example of this complexity is the Management of Mau Complex ecosystem. Mau is a critical resource for the Maasai Mara Game reserve that covers both Kenya and Tanzania. The area is critical habitat for diverse flora and fauna, the wildbeast being the most known due to their tantalizing migration. As a result of destruction on the Mau complex rivers and lakes started to dry up. It took the international outcry and pressure to get the Kenya government to enforce its policies and laws to protect this major ecosystem. This situation might have been avoided if the clear rules on transboundary natural resource management were in existence and in force.

The Framework and Guidelines on Land Policy in Africa is also pushing for regional cooperation. The framework is alive to the transboundary nature of some of the land issues and the livelihoods. The guideline acknowledges

*The Framework and Guideline on Land Policy in Africa Vision Statement:*

*Africa governments will seek to develop land policies in a manner that is inclusive and responsive to the needs of all land users, contribute to political stability, promote gender equity, foster the reduction of conflicts, enhance the sustainable management of natural resource, ensure orderly urban development and which put all stakeholders on the path to higher economic growth and a better quality of life.*

**Table 5.2: Summary of some the key regional policies relevant to pastoralism and biodiversity conservation**

Policy Instrument	What it is about	Relevance	Remarks
African Convention on the Conservation of Nature and Natural Resources	Convention negotiated by African countries within the framework of the OAU to promote conservation, utilization and development of soil, water, flora and fauna	Art VI commits states to plan conservation, utilization and management of rangeland  Art VII commits states to manage wildlife conservation in a manner compatible with other land uses	All the three countries are signatories to the Convention
Framework and Guidelines on Land Policy in Africa	Framework adopted by the AU to strengthen land rights, enhance productivity and secure livelihoods	Advocates for regional cooperation in dealing with land use issues that are transboundary, including pastoralism and conservation  Emphasizes stakeholder participation in policy formulation as the basis for successful implementation	Provides a framework for promoting tenure security
Policy Framework for Pastoralism in Africa	Framework adopted by the AU for purposes of securing, protecting and improving lives, livelihoods and rights of pastoralists	Recognizes pastoralism and asserts the rights of pastoralists to development attention comparable to that given to non-pastoral areas  Recognizes regional nature of pastoralism and proposes a regional approach to addressing its challenges  Recognizes role of pastoralism and pastoral institutions in natural resource management and range management	The framework provides new impetus for policy consideration of pastoralism and its role in national development across Africa
Treaty Establishing the East African Community	Treaty initially signed by Kenya, Uganda and Tanzania to establish the EAC and its institutions and specify their powers and functions	One of the objectives of the Treaty is to promote sustainable utilization of natural resources and protect the natural environment of Partner States  Ch 19 of the Treaty commits the Partner States to cooperate in environment and natural resource management, including wildlife conservation and management of transboundary resources and ecosystems	Can be used to put a case for livestock mobility across the borders. Free movements
Protocol on Environment and Natural Resources	Protocol to the Treaty Establishing the EAC, to further cooperation in the management of the environment and natural resource	Art 10 commits Partners States to protect and promote the use of indigenous knowledge “that is compatible with conservation or sustainable use of biological resources”  Art 12 commits Partner States to promote community based wildlife conservation and incorporate indigenous knowledge  Art 21 commits Partner States to develop and implement land tenure policies that facilitate sustainable land use and take into account rights of local communities’  Ch 22 provides for sustainable management of rangelands including involvement of local communities  Ch 23 provides for combating desertification and mitigating the effects of drought by involving local communities	The Protocol provides an entry point for pastoralism in view of its transboundary nature and close links with biodiversity conservation

the legitimacy of indigenous land rights system; recognizing the role of local and community based land administration/management institutions and structures alongside those of state. It emphasizes that deliberate steps should be taken by governments to protect and preserve indigenous knowledge system that have accumulated over generations in support of the management of key natural resources and ecosystems.

The Policy Framework for Pastoralism in Africa is also a vital instrument regarding biodiversity and drylands development. This policy aims at securing, protecting and improving the lives, livelihoods and rights of pastoralist communities. Sustainable pastoralism will not only boost biodiversity conservation in drylands but also improve the productivity of the drylands. The policy framework is important because it is a platform for mobilizing and coordinating political commitment to pastoral development in Africa. It emphasizes the regional nature of many pastoralist ecosystems in Africa and therefore the need to support and harmonize policies across the Regional Economic Communities and member states. The involvement of traditional pastoral institutions is seen as central in improving the governance of pastoral rangelands and securing access to rangelands for pastoralists.

In the past few years, Regional Economic Communities/bodies have generated very positive policy frameworks for the adoption by the member states. Given the extensiveness of the consultation during the development process, many members have signed these instruments, committing themselves to implementing them. Looked at critically, many of these policy frameworks and guidelines may be met with fate that befalls most national policies. First, the protocols, agreements and or frameworks do not have any clear implementation framework. There are no timelines and no resources allocated or dedicated to start the implementation processes. As global instruments, it is left to individual members to decide the adoption and the pace of implementation. Though most of them talk of tracking of the progress, no clear indicators have been designed and agreements build on the same for this purpose. The provisions in these frameworks mean that their implementation will require comprehensive legislative, institutional and operational measures to achieve coordinated, decentralized, transparent, efficient and cost effective delivery of services in biodiversity conservation and drylands development. This will have a far reaching implication at national levels as it calls for improved governance by reviewing and restructuring existing institutional settings and creating entirely new institutional arrangements at local, national, regional or at global levels.

## 5.7 A Review of Country Policies

National policies determine the direction and the priority areas in the country's economic investment plan as well as governance processes. They provide a framework upon which key decisions are made, strategies are developed and resources are allocated. Kenya, Ethiopia and Tanzania have responded to the ongoing biodiversity degradation in their drylands by setting up institutions that address biodiversity conservation such as National Environmental Management Authorities. In this section, we present a review of the key policies relevant to the research project.

The last one and half decade has seen a significant improvement in the policy arena in Kenya, Tanzania and even Ethiopia. There have been shifts from the exclusionary to inclusionary approaches in natural resource management with clear provisions to enhance community engagement and participation as well as the recognition of indigenous knowledge.

### 5.7.1 The constitutions of Kenya, Tanzania and Ethiopia in relation to pastoralism, biodiversity conservation and drylands development.

The constitutions of these three countries are progressive with regard to environmental management. They reflect key environmental principles necessary for effective environmental and natural resource management as well as promoting sustainable development. They are based on sound principles and uphold key freedoms. The constitutions have opened up the legal frameworks in the countries for instance, all the international instruments that Kenya is a signatory to now form part of the country's legal framework and the Ethiopia's constitution distinctly identifies and provides for the recognition of pastoralists land rights and clearly articulates the roles of the federal and the regional governments with regard to natural resource management. Tanzania's constitution provides for the following regarding conservation and property rights: (1) Every person has the duty to protect the natural resources of the United Republic, the property of the state authority, all property collectively owned by the people, and also to respect another person's [sic] property.(2) All persons shall be required by law to safeguard the property of the state authority and all property collectively owned by the people, to combat all forms of waste and squander, and to manage the national economy assiduously with the attitude of people who

are masters of the destiny of their nation.<sup>65</sup> and (3) under Article 9(c) it also provides for the preservation of natural resources for the common good, but as a general objectives thus not enforceable.

### **5.7.2 Land and natural resource (water, forest) policies and laws in Kenya, Ethiopia and Tanzania**

The main challenge for the biodiversity conservation and drylands development is resource tenure. The tenure security to uphold the rights in terms of access, control, use and management of the resources in the drylands have proved elusive. The communitarian use of resources including land in most parts of the arid and semi arid lands in the region calls for a tenure regime that recognizes and strengthens common property regimes. It also needs a system that makes extensive use of traditional institutions in the management of such resources in terms of defining and controlling access, user and control rights.

The land policies and laws in the three countries have addressed the issues pertaining to pastoral land rights through different approaches. In Tanzania, the Village Land Act 1999 is a clear attempt to respond to the needs of pastoral land rights. In Kenya, the provisions on community land tenure and by extension the discussions on the pastoral land tenure within the community land in the policy is aimed at addressing the pastoral land question. In Ethiopia, though pastoral land rights came out strongly in the constitution, it has not been effectively captured in the Rural Administration and Land Use Proclamation. Art. 40 (3) in the Ethiopia's constitution 40(3) asserts state ownership of land. There are no private property rights in land. The Rural Land Administration Proclamation of 1997 delegates responsibility for land administration to regional governments including the assigning of rights and distribution of land holdings. The land cannot be sold or mortgaged. There are however policy attempts to guarantee access and user rights as the land policy upholds the principle of equity in access to land among the farmers. The Poverty Reduction Strategy Paper reaffirms this by committing that every farmer who wants to make a livelihood from farming is entitled to a piece of land free of charge.

Though the regional governments have the delegated authority on land administration, the federal government is in charge of the of the overall policy framework. The tenure issues are thus not clearly articulated from the constitution, the federal and regional land policies and laws. The failure to recognize pastoral land rights and

the means of achieving and securing them as were recognized in the constitution has been the main major threat to pastoral land rights and tenure security. The submission by regional governments that land can be leased and given out for commercial production has made pastoral areas centre of attraction to multinational companies that want to engage on commercial large scale agricultural production through irrigation. The drylands are thus subject to commercial pressure and with the intensification of land alienation for irrigation agriculture, there is a clear threat to biodiversity in these areas. It is notable that though the law provides for land use plans being put in place for better organization and securing livelihoods. This has not been done, yet large chunks of land are being given out in the dryland areas for agricultural crop production purposes without due regard to its impact on pastoral livelihood.

In Kenya, the constitution and the Land Policy have come out strongly to safeguard land rights and address the historical injustices related to irregularities in land administration and management. Most of the lands in the arid and semi arid parts of the country fall under what was initially classified as trust land. In the current constitution, they now fall within community land tenure. The policy further substantiates on the pastoral land tenure as a component of community land and thus sets a conducive framework for addressing the communitarian nature of land access, use and control in the pastoral areas. One notable linkage of the Kenya National Land Policy with biodiversity conservation is the linkage it has made with environmental management. The policy has outlined environmental management principles, addressed the issues dealing with conservation and sustainable management of land based natural resources, outlined ecosystem protection and management principles and has addressed environmental impact assessment and audit as land management tools. The policy has opened greater space for recognition of pastoral land rights and has provided for the development of the national land use planning which is expected to further help secure key parts of arid and semi arid areas for pastoral production use.

Land administration and management are addressed by the following policy and legal documents in Tanzania: National Land Policy 1995, the Land and Village Land Act 1999, 2007 Land Use Planning Act and Tanzania Investment Act 1997. The Tanzania national Land Policy (1995) seeks to secure land tenure system in order to encourage the optimal use of land resources, facilitate broad based social and economic development without endangering environment and reconcile competing land use to reduce and manage conflicts and degradation of

environment and land based resources. The policy also seeks to address the increasing demand for grazing land as a result of increase in livestock numbers. The policy is thus good for biodiversity conservation. The Land and Village Land Act 1999 operationalized the policy. It provides the laws for land matters. The Act provides that all land in Tanzania is public land vested in the president for and on behalf of Tanzania citizens. It provides for the titling of customary rights and interest on land for occupancy. One critical provision of the Act is the power it gives to the president to transfer any area of village land to general or reserved land for the public interest (Section 4 (1)). This can be easily abused. Given the provisions of the Investment Act that is seeking to create about 2.5 million ha land bank for investment, the pastoral land that can be secured through the Act stand the risk given the provisions of section 4 parts 1 of the Act.

Both the water and forest policies and laws in the three countries promote community empowerment and participation in the water and forest management. Recognizing the role of water in sustainable development, the countries are adopting protective and conservative measures to water management. The water policies and strategies are seeking to address cross sectoral interests in water, watershed management and participatory integrated approaches in water resources planning, development and management and ensuring full participation of the beneficiaries.

Forest policies have also shifted from exclusion to inclusion. They have expanded communities' role in the participation of forest management and conservation. In Kenya, this has been done through the establishment of community forest associations that also ensure that communities generate some direct income from forest resources (see forest Act 2004).

### **5.7.3 Agriculture and Livestock policies in Kenya, Tanzania and Ethiopia**

The economies of Kenya, Tanzania and Ethiopia are agriculture based. Agriculture contributes substantially to the countries' GDP. In terms of livestock, these countries boast of large national herds meeting quite a good amount of the demand for meat.

In terms of agriculture, Ethiopia is working on agriculture development led industrialization. A strategy has been developed to this effect. The country is striving to meet food security but also be competitive in the international markets. The agricultural policy is promoting increased investment in small holder farmers by enhancing access to inputs and commercialization of agriculture. The policy is also promoting livelihoods diversification to enable

the communities cope with shocks such as drought through the provision of livelihoods packages that aim to support secondary sources of income. In recognition of population challenges in the highlands, the policy is also advocating for the resettlement of about 2.2 million people from the highlands to improved lands (usually drylands that are irrigated) to ease pressure on land. It is within the concept of improved land that government is also pursuing the sedentarization of pastoralists along the river banks to practice crop production.

In Kenya, the Ministry of Agriculture finalized and launched the Agricultural Sector Development Strategy (ASDS 2010-2015) to provide a guide on investment in the agricultural sectors between 2010 – 2015. The strategy appreciates the erratic rainfall pattern and inadequate rainfall in arid and semi arid areas. In line with this, the strategy submits that more land can be reclaimed for crop cultivation by developing irrigation infrastructure in the ASALs. Following the current trends, government through the ministry has embarked on promoting irrigation and seems to be inspired by the strategy statement that "it is estimated that intensified irrigation can increase agricultural productivity fourfold and depending on the crop income can be multiplied 10 times" (ASDS 2010 -2015). Recent surveys show that there is increased agricultural crop production in the ASALs. One of the reasons given for this emerging scenario is the frequency and the intensity of droughts in ASALs making livestock rebuilding difficult. The other reason is the migration of agriculturalists into these areas in search of alternative livelihoods or arable land.

The Tanzania's Agricultural and Livestock Policy of 1997 provided the foundation for the development of livestock policy. It highlights the negative impacts of mobility, and it states that the government should facilitate pastoralists to move from over-stocked to under-stocked areas. It also explores the utilization of irrigation potentials to achieve improved food security and production of higher value crops such as vegetables and flowers. The Tanzania's National Livestock Policy is viewed as an instrument for achieving the National Development Vision for 2025. In providing the key vision for the livestock sector, the draft policy dwells on modernizing pastoral production through sedentarization.

The focus of livestock policies in the three countries is to modernize livestock production. Key among the modernization agenda is the improvement of local breeds and attainment of disease free status by establishing disease free zones. A lot of work is currently on going through the FAO led IGAD Livestock Policy Initiative aimed at promoting pro-poor livestock policies. Most of the provisions of the livestock policy



in Kenya reflect this regional agenda. Ethiopia has also adopted the process to enrich its national livestock policy aiming at modernizing the livestock sector.

#### **5.7.4 Wildlife policies and laws in Kenya, Tanzania and Ethiopia**

There is an intricate relationship between wildlife and pastoralism. Most of the wildlife conservancies are found in the pastoral areas which constitute the dryland parts of the three countries. Wildlife play a critical role in tourism industry in Kenya and Tanzania. The pastoral production system coexists harmoniously with wildlife. Unfortunately, wildlife conservation in the three countries has focused on conservation in the original habitat thus excluding communities from accessing and exploiting the resource designated areas. Policies and laws are however changing. The Tanzania's Wildlife policy of 1999 is very community friendly in providing for communities participation in wildlife management. The Policy aims to involve a broader section of society in wildlife conservation, particularly rural communities and the private sector. The policy proposes the establishment of Wildlife Management Areas as a new category of protected area as key strategy for bringing about community-based conservation. Ethiopia is seeking to increase the government investment in wildlife protection through creation of more game reserves and in maintenance of the already established ones. Kenya has made a strategic shift and is promoting the community participation in the current draft policy and legislation. The wildlife policies and laws are aligned to the countries national environmental policies and laws. The country's environmental policies and laws are pro conservation and have borrowed heavily from the extant international environmental instruments.

While the human wildlife conflict is being addressed in the policies and laws, the emerging issues like Payment for Environmental Services (PES) and REDD is yet to be effectively captured by the policies. The ongoing efforts in developing policy frameworks for climate change is hoped will address these two for a more substantive benefit sharing in conservation.

#### **5.7.5 The economic policies of Kenya, Tanzania and Ethiopia with regard to pastoralism, biodiversity conservation and drylands development**

The main economic policies for Kenya, Tanzania and Ethiopia are pro conservation. The policies integrate sustainable environmental and natural resource management with economic development. The Tanzania's Development Vision 2025 provides the

general framework for the countries development, and the National Strategy for Growth and Reduction of Poverty commonly known as MKUKUTA is the strategy to achieve it. Though pastoralism is not mentioned in the vision 2025 policy, it is effectively recognized in MKUKUTA as a viable and sustainable livelihood that needs support. The Kenya Vision 2030 has a whole annex to it detailing the interventions aimed at developing and improving the arid and semi arid lands of the country. The Ethiopia's PASDEP did recognize pastoralism. The Growth and Transformation Plan that has been developed to build on the gains achieved through PASDEP has a chapter on pastoralism and seeks to modernize this production system. (For analysis of some the national policies and their provision on pastoralism, biodiversity conservation and dryland development, see annex 1.)

#### **5.8 The impact of policies and laws on pastoralism, biodiversity conservation and dryland development. (policy discussion)**

Looking at the policy trends from the colonial to date, it is evident that there is a significant policy shift. The colonialists, both the Germans and the Britons approached drylands as free land that were underutilized and thus could be hived off for conservation and other purposes. They did not understand the pastoralists need for expansive lands, which depending with season, quite a good chunk could be seen as lying idle. The immediate post colonial governments for Tanzania and Kenya did not make a major policy shift. Drylands were perceived as lands with low economic returns and the dominant livelihood system practiced by the people in these areas was seen as problematic due to seasonal movements thus disrupting service provision.

In this section, we would like to discuss the impact of the policies in terms of promoting the productivity of the drylands. This we would do by interrogating how the policies have protected and build asset base in the drylands, how the policies have facilitated access to resources, involved the communities and utilized the indigenous knowledge to promote conservation and enhance productivity. Because policies can attract or stifle investment, it is important to reflect on the countries' main economic policies and how they have driven development in the drylands.

Sustainable development of the drylands in the region is only possible if the livelihoods making use of the dryland resources are themselves sustainable and producing at their maximum. Sustainability of any livelihood however is dependent on the interaction between policy framework and livelihood assets. Policies influence the promotion and protection of the livelihood assets by regulating access, use, control and management. The level of control the people (individuals or groups) have over the assets determines the power they hold to influence policy and institutional processes. The interaction of the policy processes and people/individuals is therefore a critical determinant of productivity.

The livelihood asset base in the drylands is deteriorating. There is an increase in environmental degradation due to many factors such as increased population pressure, restrictions on mobility, forced and unplanned settlements by those that have fallen off the pastoral production system among others. A critical analysis of the root cause to the increasing environmental degradation points at tenure insecurity as one of the issues. The provision of land tenure security for the dryland communities like pastoralists has been a major challenge to many governments in the region. The use and management of land and other natural resources in the drylands is communitarian. Coupled with the extensiveness of pastoralism, most tenure provisions in the constitutions and laws have been inappropriate for pastoralists who are the main custodian of these lands. This has impacted negatively on the development of pastoralism and other drylands livelihoods. The trend has exposed pastoral lands for alternative land uses without consultation with the communities as there has been no way to secure the land.

With the wave of reforms sweeping across the region, new legal and policy instruments are coming up to redeem the situation. There is a ray of hope with Kenya's Constitution and National Land Policy which, have explicitly provided the community land tenure and Tanzania's Village Land Use Act of 2007 which also provides for the registration of customary rights through village land use plans. For Kenya, the constitution has provided for a time frame to operationalize the provisions under community land. The kind of legislations that will be enacted to give life to these constitutional provisions will make the success or failure of the use of community land tenure to improve tenure securities in the pastoral areas which constitute a large percentage of the dryland in the country. In Tanzania, there has

For a long time (pre-colonial period) drylands were managed through strong traditional institutions. Traditional natural resource management practices started suffering from marginalization and undermining with the introduction of formal law. The traditional customary system has never been properly engrained in the constitutions of the countries in the region since independence. Though some recognition was given to the customary law in the legal system after independence, it was always at the bottom of the system and common law procedures and practices always overrode it. Tanzania has made some good progress in recognizing and promoting customary law. Through the amendment to the constitution, the customary law now forms the integral part of the constitutional and legal system in Tanzania. The significance of this is seen within the land administration and management sector where the land policy, the Village Land Act and the Village Land Use Act have recognized customary rights to land and provided for the procedure of the registration of such rights through village land use plans. Kenya through the new constitution and the land policy has also improved the recognition of the indigenous knowledge in the sector of natural resource management. It is expected that through such recognitions, community ownership and involvement in sustainable management of the resources shall increase.

been no systematic implementation of the Village Land Use Act of 2007. The inadequacy of technical capacity and inadequate financial resources has been cited as some of the major constraints.

The environmental and conservation policies and laws have remarkably improved. Starting with the constitutions, protection and sustainable use of natural resource is clearly provided for. The involvement of the communities in conservation to improve their incomes is captured in forest, water, wildlife and national environmental policies and laws. The national policies and laws are further reinforced by the countries' adoption and domestication of major global conventions and regional protocols such as Convention on Biodiversity conservation, and the protocol on Environment and Natural resource (for East Africa Community Members). The opening up of policy space for conservation has seen several community based conservancies' spring up in drylands tapping into the rich tourism industry. Though the picture looks rosy, issues such as equitable benefit and cost sharing are yet to be worked out clearly in practice and within the policies. Baseline assessment to give the status and to help the prioritization of policy components is not available for most policies.

Usually, policy development generates a lot of heat. Many stakeholders come to participate in the process proffering different scenarios and policy solutions. One unfortunate thing however is that policy implementation in most cases doesn't feature in the discourse during formulation process. Key policy documents are debated and disseminated to the public and experts without the implementation component. This has been a major setback in the policy arena. The gains from the positive policy provisions in biodiversity conservation and dryland development are lost because of the weak implementation framework. The development of the policy implementation strategies doesn't benefit from diverse stakeholders participation and expertise. They are mostly done in-house through administrative instructions thus making implementation process opaque and shrouded with secrecy.

Access to resources in the drylands by the communities is important. The policy shift from in situ to ex situ conservation in wildlife conservation is a laudable move. The focus by land policies across the countries to secure access and user rights is also important. The extant policies when implemented effectively have the capacity to improve access to resources in the drylands. One critical missing link in promoting access to resources in a peaceable and organized manner is the absence of formally demarcated migratory corridors for livestock within and across the countries. Given the importance of livestock migration in conservation the ecosystems in the drylands, it is paramount for the governments to take advantage of the West Africa Livestock migration models to guide them in developing in country and regional migration corridors.

In conclusion and in general terms building on the current trends, there is a renewed focus in drylands development. Kenya, Tanzania and Ethiopia have recognized the need to develop drylands in the main economic policies. For Kenya and Ethiopia, the establishment of institutional frameworks to deal with pastoral and drylands development is a clear testimony of the renewed interest. Kenya has the Ministry of State for the Development of Northern Kenya and Other Arid Lands. The ministry has championed the review of policies and administrative statement that were inhibiting the development of the ASALs like the security provision that required one to get clearance before travelling to the Northern Kenya. It has also championed the development of Arid and Semi Arid Lands Development Policy, which is currently awaiting Parliament's approval. In Ethiopia, there is Parliamentary Standing Committee on Pastoralists Affairs.

### Policy Challenges in the drylands:

- Unprecedented increase in pastoralists drop out from the pastoral production system.
- Increasing environmental and natural resource degradation.
- Inadequate resources for policy implementation.
- Inadequate co-ordination of development interventions due to sectoral approach in policy and projects formulations and implementation.
- Inadequate civil society organizations (including INGOs) in policy implementation.
- Limited or lack of quantitative and qualitative data to facilitate resource planning, access, use and conservation

These institutional and policy development are critical for the growth of drylands. Development in its totality is freedom. It comes with opportunities that enable people to make choices. The opportunities however demand for the presence of the capability to take meaningful advantage of them. One critical policy gap is the investment in capacity development at institutional and individual levels. For serious drylands development and conservation, governments and development actors must invest more in developing capacities for sustainable drylands and livelihoods development.

## 5.9. Conclusion and recommendations

The overall impression from the review of the policies is that there is improvement in policy environment. Efforts are being made at the country and at the regional levels to ensure that biodiversity conservation is integrated into economic planning and development plans of the countries, and of the drylands. In conclusion, the following are some of the observations made:

- The policy context is improving but still inadequate in terms of effective coordination.
- At least there are national institutions dealing with drylands development. The absence of such institutions at regional level is a challenge to transboundary focus.
- There are multiplicity of sectoral laws, policies and strategies at national level. Due to competing mandates, implementation and or enforcement is compromised.
- The regional frameworks have strong components promoting transboundary planning and sustainable use of shared resources. However, there are no national mechanisms to enforce or implement them.

- Policy formulation and legislation process are participatory. This has a bearing on the quality of some of the laws and policies. Policy implementation and enforcement of the laws is generally weak (national & regional)
- Community participation and influencing policy processes is still limited. Capacity building interventions are needed to enable communities take advantage of existing opportunities

Drylands have huge potentials and will play critical role in taking the countries forward. It is therefore the approach to the development of drylands the countries will play a great role in the attainment of food security and fast tracking sustainable development in the areas. The vastness of these lands and the resources they carry must be used to move the countries forward in terms of development. Kenya, Tanzania and Ethiopia must therefore make a deliberate choice to investment substantively in developing their drylands. This will call for the following:

1. Review and harmoniously consolidate the diverse sectoral policies with a bearing to pastoralism, biodiversity conservation and drylands or ASALs development. In addition to the consolidation, a comprehensive institutional framework should be established to coordinate government and other stakeholders' interventions in the drylands. For the country like Kenya that has done so, there should a proper legal framework that supports the institutions coordination role.
2. Governments should invest more in drylands development research to generate more knowledge on different models applicable to drylands development. Universities should establish faculties to deal comprehensively with dryland development. As part of this effort, governments of the three countries should establish dryland research and development centres to take lead on the generation and package of knowledge with regard to drylands development.
3. There is need to secure pastoral mobility within and without the borders. Livestock routes should thus be demarcated and opened up to facilitate conflict free movement of livestock and people. In addition to this, wet season and dry season grazing lands needs to identified/mapped and secured.
4. Most of the land policies and laws in the three countries reflect the need for land use planning. To facilitate effective and appropriate investment in drylands/pastoral areas, land use planning should be done. This will help secure pastoral livelihood and also help reduce conflict between competing land uses.
5. The countries should recognize pastoralism and implement the provisions stipulated in AU Policy Framework for Pastoralism.

# 6. Key Findings and Recommendations

Drylands are key areas for Eastern Africa, as they constitute about three quarters of their surface. In the last century, **drylands** have been usually **perceived** as areas with **little interest** for **economic** development and as a **burden** for policymakers, and their population has often been **marginalized** in development policies. Most designers of these policies had an agricultural background from temperate and/or humid areas and they thus had a poor understanding of dryland dynamics. This reality contrasts with the traditional wealth and power of communities situated in pastoralist areas (Cummins 2009) and highlights the **misunderstandings** to which dryland development has been subjected.

Drylands offer a wide array of livelihood options for the population living in them. However, the economic value of these options tends to be undervalued by the usual national accounting mechanisms. Livelihoods in drylands **depend** highly on the **ecosystem** and its **biodiversity**. Much of the commercial transactions take place inside the communities and not through external markets. Many products are consumed domestically, so that their true economic **value** is **not captured**. Inhabitants of drylands are thus perceived to be **poorer than they actually are**. But data show that drylands produce a wide variety of products, to the extent that most of the products typically perceived as provided by livestock, such as meat, milk or hides, originate from pastoralist communities in Eastern African drylands. Moreover, pastoralism **provides valuable ecosystem services** whose economic value, while not captured in the current national accountability systems, has the capacity to sustain the livelihoods of non-pastoralists also living in their drylands, as well as the potential to generate **income** in the **future**. This has already happened with the **tourism** industry that relies on wildlife and could happen in the near future in respect to **carbon markets**, among others.

Many of the **alternatives** offered for dryland development just take into account the **short-term** economic profit, but **not** the **sustainability** of these activities in the long term. The short-term approaches do not only lead to the disruption of ecosystem processes and to **environmental degradation**, but also to the **degradation** of the **livelihoods** that depend

on the conservation of biodiversity and to the loss of opportunities for economic development. The poverty associated with drylands is often linked with poor application of development policies that focus on short-term gains rather than on long-term benefits integrating economic, social and environmentally sound development.

When developing action strategies in drylands, policymakers should understand that **simple solutions** are **not** likely to be the **best answer** to complex questions such as the ones faced in development. A combination of development actions is required for every type of situation analyzed in this study (**development domain**) in order to achieve an **integrated development** approach. Every development domain is greatly influenced by the surrounding ecological conditions, by the population density and by the access potential to markets. Moreover, these development domains should not be regarded as discrete entities, but rather as a **continuum** of situations that the proposed solutions have to adapt to. This study offers **guidelines** for **development** options in situations that range from highly populated, close to market humid areas, to the usually most neglected areas that have a low population density, are far from markets and have an arid climate.

Regional policymaking needs to recognize the value of activities performed in drylands, either already captured by national accounting mechanisms or not. These policies must also recognize the **cross-border** nature of most of these activities, that depend more on the ecosystem boundaries than on the political ones. The **ecosystem approach** required for the development policies in the drylands of the Eastern African region implies a strong need for **policy harmonization** and for overcoming national borders for ecosystem management. Learning can be done from other regions such as Western Africa (Zoundi & Hitimana 2008), where former crises in the past (Sinclair & Fryxell 1985) have led to a more sound regional approach. In a model **also** applied by regional bodies from **developed economies**, such as in the European Union, the compromise acquired by the national states through regional policy frameworks can be a powerful tool to

enforce policy change in national policies. The role of **regional bodies** such as IGAD, AU or EAC will therefore be fundamental in the future.

This study was presented to stakeholders from the three countries (Ethiopia, Kenya and Tanzania) included in the study at a National Dialogue Workshop held in Nairobi during the 24th and 25th October 2011. It was as well presented to stakeholders from regional organizations of the three abovementioned countries plus Uganda (pastoralist CSOs, research bodies and regional governmental organizations) at a Regional Dialogue Workshop held in Arusha during the 27th and 28th October 2011. In light of the information presented by the study, the stakeholders made the following specific **recommendations**:

- 1) **Climate change** and **climate variability** were found to be serious challenges for livelihoods in drylands, as was the **biodiversity crisis**. In light of the results of the study, the maintenance of **mobility** was considered key both for adaptation strategies and for biodiversity maintenance. Clear demand for **regional alert systems** was expressed. Land tenure is a key factor for mobility maintenance, especially regarding the support of **communal tenure** in drylands. Participatory approaches are fundamental to guarantee the ownership of development measures by local communities.
- 2) Access to **social services** such as veterinary, health and education was considered to be key for communities living in dryland areas, whereas the **ecosystem services** provided by sustainable livelihoods should pay for the increased cost of the service delivery by the state. The access to banking and **financial services** in remote areas, as shown by the ones associated with mobile phones, has proven to be key to facilitate the **marketing** of products. Social and infrastructure services should also pay special attention to **women empowerment**, including specific marketing of products produced by women. The potential of radio broadcasting in local languages was highlighted as a very powerful tool for building capacity of dryland inhabitants, particularly pastoralists.
- 3) A clear mandate was expressed by the participants of the Dialogue Meetings to involve parliamentary representatives (**MPs**) of pastoralists in dryland discussions. MPs have often shown an **inadequate understanding** of dryland issues, but they usually have little time to participate in capacity building events. It is the mandate of the Dialogue Meetings to stimulate grassroots organizations, local leaders and elders to exert **pressure** on their MPs so that the **capacity of the policymakers is built** through the information available thanks to research from the institutions capable of delivering that knowledge. This study was considered a good example of the type of knowledge they should get. A specific action plan regarding the pastoralist weeks to be held in Ethiopia, Kenya, Tanzania and Uganda was designed, where the results of this study will be presented.

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## Annex 4.1

Strategy	when applicable	Constraints	Opportunities	Threats	Investments needed	Policy support	References
<b>1. Enhancement of livestock production</b>				Degradation (+/-), Carbon emissions, Reduced plant and large mammal biodiversity, Conflict over resources, Disease risk	Services	mobility (inclusive cross-boundary), regulations to reduce disease risk, protection of drought grazing reserves, market support and info	Little <i>et al.</i> , 2001
<b>2. Diversification</b>		lack of capital		Competition for resources and conflict		Flexible access to land and water and regulations of collaborative management	Watson and van Binsbergen, 2008
small-scale cropping	labor available	short growing season; diseases		competition with key dry season grazing resources; nutrient mining			
large-scale cropping	relatively fertile land with relatively few people				infrastructure	macro-economic policy, land policy (private land rights), induce private investments, well-functioning markets, public sector and governance reform, manage social and environmental impacts	WB, Africa's sleeping Giant
bio-fuels	areas not suitable for crop production; labor available			loss of biodiversity, soil degradation, reduced staple food production			Africa learning from Asia
natural products carbon sequestration Conservancies	land fragmentation, crops, etc. curtailability		Direct payments to households	opportunity costs, knock on effects of displacement		Landscape approach; institutions governing equal (pro-poor) payments	de Leeuw <i>et al.</i> (submitted)
<b>3. Exit/ outmigration</b> basket making/ handicrafts small trade		lack of capital and skills					

## Annex 5.1. Review of country policies and laws

Ethiopia:	Strategy	What it is about	Relevance	Remarks
Constitution of the Federal Republic of Ethiopia	Is the foundation of the legal, institutional and policy framework of the country.	Gives broad principles on governance (both environmental and political for sustainable development). Recognizes pastoralists and clearly articulates their rights to land. Decentralizes the management of natural resources	This is a strong entry point for addressing the land tenure security and participation of dryland communities in natural resource management	
Growth and Transformation Plan (PASDEP II)	Is the main economic development policy. This document succeeds PASDEP. It spells out the official vision of the country in pursuit of economic development	Recognizes the need to develop pastoral areas (the drylands) Emphasizes the need for increased investment in agriculture for accelerated industrialization process.	Very pro-investment document. And gives agricultural production high recognition. It might be used to further advocate for sedimentation of pastoralists in the drylands to practice irrigation agriculture.	
Agricultural-Development Led Industrialization Strategy (ADLI)	This was a strategy to promote agricultural production as a foundation for industrialization.	Recognizes the role of agriculture in industrialization	May have to be reviewed as the growth and transformation plan has captured several things from the strategy.	
Rural Land Administration and Land Use Proclamation	Is the basic legal instrument governing land management and administration. It seeks to operational constitutional provisions land	Pastoral land rights are not highlighted in this law. It therefore makes the translation of the constitutional provisions difficult with regard to securing the pastoral land.	This law weakened the pastoral land rights as it blocked the clear avenue for its realization. The ongoing land grabbing in pastoral areas for large scale agricultural production with little regard to pastoral land can be attributed to this law.	
Water Resources Management Proclamation 197/2000 and Federal Water Resources Management Policy	These are the legal and policy instruments governing water resources management	The instruments provide clear set of provisions for water resource management through permit system. They promote integrated water resources management, adopts basin wide approach, coordination and participation of stakeholders	There is emphasis on community participation or involvement in water management through local river wide basin institutions.	
Livestock Development Master Plan	The master plan aims at developing livestock sector to play a critical role in Ethiopia industrialization process. It is closely linked to IGAD LPI.	Basically emphasizes modernization of livestock sector	The plan seeks to modernize pastoralism for the increased productivity.	



Ethiopia's Wildlife Policy and Strategy	<p>The objective of the policy and the strategy is to create a conducive environment whereby the country's wildlife and their habitats are protected and developed in a sustainable manner, and to enable the sector play an important role in the economic development of the country.</p> <p>The other critical objective is the protection of the wildlife resources and their habitats, maintaining the balance of nature for prosperity in accordance with international wildlife convention and agreement to which the country is signatory.</p> <p>The critical provision in this policy is the provision that the country should unit with neighboring countries to establish transboundary protected areas, where such protected area do not currently exist.</p>
Environmental Policy of Ethiopia, 1997	<p>The policy was approved in April 1997. It constitutes eleven cross-sectoral policy elements. The overall goal of the policy is to improve and enhance health and quality of the life of all Ethiopians, and to promote sustainable social and economic development through sound management and use of natural, human-made and cultural resource and to environment as a whole, so as to meet the needs of the present generation without compromising the ability of future generation to meet their own need</p>
Conservation Strategy of Ethiopia, 1997	<p>strategy provides an adequate umbrella strategic framework detailing principles, guidelines and strategies for effective management of the environment. It also elaborate state of resource base of the country as well as the institutional arrangement and action plan for the realization of the strategy.</p>
Rural and Agricultural Development Policies and Strategies of Ethiopia, 2002	<p>Rural Development Policies and Strategies [RADPS] was adopted by government in March 2002. In the context of combating desertification and mitigating the effects of drought. It provides for the following:</p> <ul style="list-style-type: none"> <li>• improving farming skills;</li> <li>• improving the supply, replication and dissemination of technologies; ensuring access to land and</li> <li>• tenure security; resolving problems of drought prone regions; improving the agricultural</li> <li>• marketing systems; promoting rural finance; developing the rural energy sector and rural telecom development</li> </ul>
Food Security for Pastoral Systems Strategy	<p>This addresses the livestock and human population pressure on rangeland resources, soil erosion, deforestation and bush encroachment. It talks about improving livestock productivity, reducing the size of house hold livestock holding and diversification outside pastoralism into other local economic activities would contribute to resolving the pressure on meager pastoral resources.</p> <p>The strategy also provides for non-coercive settlement in consultation with local communities, encouraging sedentarization on the basis of small scale irrigation schemes, strengthening early warning system.</p>
Environmental Organs Establishment Proclamation	<p>This repealed the Proclamation on the establishment of EPA (Environmental Protection Authority). It puts EPA and the office of the Prime Minister and establishes Environmental Protection Council (EPC). EPC oversees the activities of EPA and ensures coordination among sectoral ministries and agencies on environmental matters.</p> <p>The Proclamation makes it mandatory for the establishment of regional environmental organs to coordinate environmental activities at the region.</p>
Environmental Impact Assessment Proclamation, 2002	<p>The Proclamation NO. 299/2002 empowered EPA to prepare procedure, regulations, guidelines and standards to effectively implement and enforce EIA proclamation. It provides the environmental guidelines that provide inclusion of environmental issues and principles of sustainable development into development proposals.</p>

## Review of the policies and policy processes in Kenya relative to land, water, livestock, wildlife and pastoralism, highlighting trans-boundary dimensions

Strategy	What it is about	Relevance	Remarks
The constitution	Is the foundation for legal and policy development in the country. Gives clear principles to guide development and governance and also secures rights for all groups	Emphasizes equitable development Clearly established community/group rights as well as individual rights Made signed international instruments signed by the country part of the legal system Has provided for the devolution and the decentralization in management of most of the local resources	Provides a proper right based framework for the development of ASALS and calls for affirmative actions to bridge the gap between the ASALS and other regions in the country.  The constitution is very strong in promoting sustainable environmental management and development.
National Land Policy	This is the framework or the guideline for the management and administration of land. It provides a framework for land and land policy reforms.	The land policy addresses the land tenure security, sustainable use and effective land administration. Also proposes mechanism of addressing the historical land injustices. Proposes the development of land use planning	The provision for pastoral and community land tenure in the policy provides a good framework for securing group or community land rights in the dry lands.  Land use planning also provides opportunity for securing the pastoral livelihoods
Vision 2030	This is the main economic policy guiding the economic development. Is very solid in addressing economic, political and social issues including the needs of dryland communities	The policy has an annex on drylands development. Has highlighted key flagships projects for the development of ASALS Provides a generally positive framework for steering development in ASALS	As a document driving investment in the country, Vision 2030 when effectively implemented will change the status of ASALS positively.  Efforts should be made to ensure that to ensure implementation.
Draft Arid and Semi Arid Policy	This document spells out the development needs, the strategies and the resources required for the growth of ASALS. The sessional paper is awaiting discussion in parliament	This is a strategy come policy paper. It clearly highlights the priority areas for ASALS development and the resources that will be needed. It proposes an institutional framework to manage the risks associated with droughts, which is a key hazard in ASALS	There is need to have this document reviewed to align it with the constitution and have parliament pass it.  CSOs can work together with government to implement the provisions of the policy
Livestock Development Policy	Is the main guide on the development of livestock sector in the country	This policy provides an overall framework for the livestock development in totality. Proposes the establishment of disease free zones, legalization of community health workers and the establishment of the Livestock Marketing Board.	The policy has good provisions for developing livestock resources as key assets in the hands of the poor. Implementation framework needs to be worked out as well as monitoring, learning and evaluation frameworks.
Water Act 2002 and Water Policy	Provides the legal and policy framework for the water management in the country.	Promotes integrated water resources management. Promotes participation through water recourse users association Takes ecosystem approach	The weak capacities of WRUAs in the pastoral areas is key concern
The Draft Wildlife Act and Policy	Legal and policy documents for the management of wildlife resources	Have strongly brought on board the concept of community conservancies, addresses cost-benefit sharing and compensation issues among others	Provides good opportunities for public private partnership in wildlife management

Environmental Management and Coordination Act, 1999	Is the main environmental management legislation.	The law provides for environmental management coordination. It overrides all other sectoral laws and policies in case of inconsistencies or conflict. Established National Environmental Authority	Very good law in promoting environmental management and biodiversity conservation. This is because it provides and leaves room for the development of sector specific laws and strategies but seeks to provide the overall coordination
National Museums Act, Cap 216, The Antiquities and Monuments Act, cap 215 of 1985	This gives the National Museums of Kenya legislative authority to regulate all of Kenya's archeological and paleontological sites and monuments including prehistoric, cultural and biological specimens. The institutions also does active research.		

## Tanzania:

### Review of the policies and policy processes in Tanzania relative to land, water, livestock, wildlife and pastoralism, highlighting transboundary dimensions

The Constitution			
National Land policy and the Village Land Act No 4 of 1999	Provides the legal basis for the land management and administration.	Can be used to promote or secure pastoralists interests but can also be used otherwise Have provisions for grazing rights Promotes public ownership of the natural resource which sometimes interferes with private ownership of wells and thus means of controlling access to resources	These provisions are largely unknown The provisions in the policy and Act prevent trans-boundary migrations leading to interference with seasonal grazing patterns. The policy and the Act has not secured land for the pastoralists. A lot of land has been carved off for other land uses  The implementation of the land laws have been clouded by misperceptions depicting pastoralists as the problem( eg pastoralism not environmental friendly, violates tenure security, doesn't address poverty etc.)
National Strategy for Growth and Poverty Reduction (MKUKUTA)	The economic development blueprint thus the principal economic policy in Tanzania	Recognizes pastoralism as a sustainable livelihood. Seeks to promote efficient utilization of rangeland. Empower pastoralists to improve livestock production through access to veterinary services and reliable water supply	Provided a good framework for improving investment in water supply, veterinary services in the drylands. Unfortunately most policies and laws that were to support its effectively implementation most didn't have that good understanding of pastoralism
Ngorongoro Conservation Area Ordinance, Cap 413 (Revised)	Is what created the Ngorongoro Conservation Area. It creates NCA that oversees the administration of this land	NCAA administers the area but there is no community representative in it. Makes rules to control entry, residence and settlement. Controls cultivation and grazing or any other land use in the interest of soil erosion	Provides a strong institutional framework which when used effectively with proper community involvement can further integrate pastoralism and conservation as they are complimentary.

<p>Wild life Policy (1998)</p>	<p><b>Provides a framework of integrating wild life conservation into rural development. It is what provided the needed framework for community participation in wild life management</b></p>	<p><b>Vests the ownership of wildlife to the state. Government only access user rights to various stakeholders</b></p> <p>Seeks to improve the involvement of rural communities and private sector in wildlife conservation</p> <p>The policy provides for the establishment of Wildlife Management Area (WMAs) on village land to promote community based conservation.</p> <p>Has provided for measures that bring equitable sharing of the revenues from tourist hunting to rural communities.</p> <p>Provides for the establishment of authorized associations for sustainable management of wildlife outside core protected areas</p>	<p>This policy provides a strong framework for community participation in wildlife and other biodiversity conservation.</p> <p>Stakeholders however need to follow through to ensure that these positive provisions are taken on board in legislation development, for it is the laws that can further open the opportunities or restrict and take back the gains.</p>
<p>Wildlife Management Areas, Regulations, 2003</p>	<p><b>Are the basic legal instruments governing the management of wildlife</b></p>	<p>Provides the basis for the conversation of the community/village land into Game Controlled area. Such a move enables the minister in charge to make decisions without recourse to village or parliament</p>	<p>Conservation has been used to take over pastoralists grazing land. Attempts have not been made by the government to appreciate the compatibility of the two systems</p>
<p>Wildlife Conservation Act. 2009</p>	<p><b>This is the law to make better provisions for the conservation, management, protection and sustainable utilization of wildlife and wildlife products and the repeal the Wildlife Conservation Act Cap 283.</b></p>	<p>States that all animals in Tanzania shall continue to be public property and remain vested in the President as a trustee for and on behalf of the people of Tanzania.</p> <p>Gives responsibility of managing Wildlife Management Areas to the local communities</p> <p>It establishes Wildlife Authority to manage wild life resources outside Ngorongoro Conservation Area and National Parks.</p> <p>One critical challenge is the power Art 14 91) gives the president power to declare any area of Tanzania through a gazette after consultation with relevant local authorities.</p> <p>Art 14 (2) President may, by order in Gazette apply any conditions applicable to a game reserve to any area of Tanzania.</p> <p>Art 15 Prohibits the entry into a game reserve without a written authority of the Director.</p> <p>The important provision is in Art. (5) which states that no land falling under the village land will be included in the game reserve? However, Art 18 (2) prohibits any person from grazing in the game reserve or wetland.</p> <p>Regarding the Wildlife Management Areas, these are established under Art 31 for the purposes of effecting community based wildlife conservation. It is provided that they be established in i) outside core protected areas, ii) which are used by local community members and within the village land.</p> <p>Art. 31 (2) talks about benefit sharing and Art 31 (4) Provides that the Minister may prepare a model by- law in consultation with local authority to be adopted by village authorities which shall apply in the respective wildlife management areas. In making regulations, the consultation of the local communities and the need to inform them accurately is provided for under Art 31 (5). WMA activities must be in conformity with Forest Act, Bee Keeping Act, EMA or any other relevant law.</p> <p>The enforcement of the Act has created a lot of conflicts because of little consultation between the communities and government officials. It has opportunities but the community must be organized and engage the government effectively to ensure pro community conservation provisions are implemented together with the rules.</p>	<p>Conservation has been used to take over pastoralists grazing land. Attempts have not been made by the government to appreciate the compatibility of the two systems</p>

<p>National Environmental Policy 1997</p>	<p>Is the overall environmental management framework. Provides framework for making consensual agreements at all levels for making trade off and the right choice between immediate economic benefit to meet short term and urgent development needs and long term sustainability benefits.</p> <p>Has provided the foundation for development of unifying set of principles and objectives for integrated multi-sectoral approach necessary in addressing the totality of the environment including fostering government wide commitment to integration of environmental concerns in the sectoral policies, strategies, investment decisions, development etc</p>	<p>The Policy provides that protection of environment is each and every Tanzanian's responsibility.</p> <p>Provides for the integration of policies, strategies and programmes for the conservation of biological diversity and sustainable use of biological and genetic resources into relevant sectoral/cross sectoral policies, strategies and programs.</p> <p>Provides that integrated land use planning secure access to land resources and the right to participation in decision relating to their management shall be ensured.</p> <p>Provided for the principle of best achievable environmentally sound technologies to be applied in all cases.</p> <p>Provides for the development of biotechnology, especially to ensure fair and equitable sharing of the result and the benefits arising out of utilization by foreign recipients of genetic resources originating from Tanzania and biosafety.</p> <p>Proposes the introduction of environmental education particularly in primary and secondary schools curricula.</p> <p>Recognizes the role of NGOs and private sector in promoting sustainable environmental management. It also proposes the need for the NGOs and Private Sector to establish their own mechanism for cooperative networks to facilitate sharing of experiences and expertise for planning, design and implementation of environmental programs at national, Regional, district and community levels.</p>
<p>Environmental Management Act 2004</p>	<p>This Act provides the legal and institutional framework for sustainable management of environment, outlining principles for management, impact and risk assessment, environmental quality standards and public participation among others.</p>	<p>Provides the basis for the implementation of international instruments on environment and the implementation of the national environment policy.</p> <p>Has provided for the continued existence of National Environment Management Council.</p> <p>Provided for the establishment of National Environmental Fund.</p>







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