

**PASTORALISM AS A CONSERVATION STRATEGY AND CONTRIBUTOR
TO LIVELIHOOD SECURITY**

KENYA COUNTRY STUDY

**By;
Environment Liaison Centre International (ELCI)**

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TABLE OF CONTENTS

EXECUTIVE SUMMARY	3
1. INTRODUCTION	6
The World Initiative on Sustainable Pastoralism (WISP)	7
2. INTRODUCTION TO THE COUNTRY: KENYA.....	8
The Pastoralists Lands	8
3. NATURAL RESOURCES AND FORMS OF LAND USE	9
The Changing Face of Pastoralism	9
Tourism and the Dry lands.....	11
Agriculture within the dry lands	13
Timber and Non-Timber Products in the Dry lands	14
Emerging Policy Trends for the Pastoralist Land Use Systems	20
4. PASTORALIST NRM STRATEGIES.....	20
Customary Natural Resource Management Strategies	22
5. PASTORALIST INSTITUTIONS FOR NRM.....	24
Customary Institutions for Managing Natural Resources.....	24
Community Based Institutions.....	25
Government Institutions.....	25
The Trust Lands	26
The Group Ranch Model	27
Special Government Programmes.....	27
6. MANAGING FOR RISK AND ENHANCING RESILIENCE	28
Disease Control.....	29
Early Warning Systems.....	30
7. COMPATIBILITY WITH OTHER FORMS OF LAND USE	31
8. THE ENABLING POLICY FOR PASTORALISM	32
9. CONCLUSION.....	36
REFERENCES	38
Annex: Terms of Reference	41

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EXECUTIVE SUMMARY

Although Kenya is a largely arid and semi arid country, with an estimated 80% of the country's land mass being classified as ASALs, official government development policies have since pre-independence tended to focus on promoting agriculture in the high potential/arable parts of the country. In the recent past, there has been an interest in promoting sustainable development among the people living in the ASALs, with a range of government and NGO programmes being implemented. However, these have been constrained by the sheer magnitude of the task, in that there have been significant changes between the traditional forms of pastoralism and the more market driven pastoralism, thus making it more difficult to understand and respond to the changing needs of pastoralists; insecurity, the construction of permanent watering points and other factors have contributed to the greater sedentarisation of pastoralist groups; while changes in land tenure and use has continued to affect ASAL areas.

In response to an identified gap, whereby current research findings have tended to remain within the academic realm, where they have had a limited input into policy dialogue and development, IUCN-EARO is executing the World Initiative on Sustainable Pastoralism (WISP), on behalf of UNDP. This project has the overall goal of enhancing the enabling environment for sustainable rangeland management, improved pastoral livelihoods, and pastoral empowerment. Its purpose is to advocate and engage in capacity building in support of pastoral sustainable land management, through catalytic partnership between pastoralists, donors, UN agencies, NGOs and the private sector. The WISP project will focus on 8 countries.

One of the initial activities of the WISP project is the commissioning of national and regional studies that seek to analyze and synthesize past work on pastoralism and the importance of natural resources to pastoralists in Eastern Africa, considering pastoralism as a form of conservation.

This Kenya national report provides maps of the agro-ecological zone of the country and the key production/livelihood systems, which illustrate the vast area that falls within ASALs and wherein pastoralism is the key form of livelihood. The changing face of pastoralism is illustrated by examples of factors that have forced people in the ASALs to adapt and change their lifestyles. These include changes in land tenure, changing lifestyles, including eating habits, policies that were aimed at making pastoralists more sedentary, the in-migration of agricultural communities into the dry lands, insecurity, and the greater commercialization of commodities, including livestock, of the dry lands. For example, it is estimated that about 75% of the Rendille and Ariaal pastoralists of Marsabit district are now settled, with the settlement centers carrying up to 40% of their total livestock population.

There have been significant changes in the types of livestock kept by pastoralists in Kenya, with the introduction of mixed breeds (cross-breeds between indigenous and exotic breeds). These cross-breeds have different pasture and water needs and are also not as resilient towards diseases as the indigenous ones. However, they are higher producers of beef and milk than the indigenous breeds, making it possible for

pastoralists in Kenya to make a greater contribution to the local, regional and export markets. Therefore, despite many set-backs, Kenya's livestock sector is said to be growing and currently contributes over 10% of the country's GDP. This growth is expected to continue especially with the reopening of the export trade, to countries such as Mauritius, and the re-opening of the Kenya Meat Commission (KMC) in June 2006, that is expected to be slaughtering about 1,000 cows per day.

Another significant land use in the ASALs is tourism, with about 90% of the 50 gazetted national parks, sanctuaries and game reserves being located in the ASALs. Although wildlife-based tourism is one of the few forms of land use that is compatible with pastoralism, there is often limited official recognition of this fact, and the benefits of tourism rarely accrue to the local pastoral communities. A significant trend within the tourism sector is the greater participation of pastoralist communities in the setting aside of land for wildlife conservation and the increase in the benefits they are accruing from tourism. Some of these groups are zoning their land, to cater for tourism, pastoralist and agricultural activities.

Agriculture within the dry lands continues to pose a threat to the pastoral way of life and in some cases is having devastating environmental impacts. These agricultural activities tend to take up areas that are normally reserved for dry season grazing, such as those along rivers and on mountains. Conflicts between agricultural and pastoral communities tend to occur, especially during drought periods.

Within the ASALs are a wide range of timber and non-timber products that are of use to the pastoral communities and also to outsiders. Some of these are gaining prominence in local, national, regional and international trade. Charcoal and firewood continue to be used for subsistence and to meet the demand of urban areas and areas with large settlements, including refugee camps. Gums and resins found in the dry lands have many uses locally and are also traded internationally. A wide range of medicinal plants are being targeted for the international trade, in some cases resulting in the respective plants becoming endangered, such as aloes and the Sandalwood tree. The HIV/AIDS pandemic, global trends towards the use of natural remedies, and the growth in bio-prospecting are fuelling the exploitation of medicinal plants from the ASALs.

Introduced species, such as neem and *Prosopis spp.*, are playing a significant role in the ASALs, and are sometimes considered a blessing and in some cases a curse, by the different pastoral communities. The ability of these communities to utilize introduced species, is contributing to their acceptance or rejection of these plants, which are sometimes considered invasives.

Traditionally, pastoral communities had a range of natural resource management strategies. While some of these may have been lost, due to changing circumstances, some of them are still practiced. The key to all these management strategies was the need to regulate the use of natural resources, by reducing destructive patterns of use, such as over-harvesting, over-grazing and the indiscriminate use of fire. Traditionally, territories were defined by each ethnic group, and areas set aside for wet and dry season grazing. Further, herds were divided, according to species and production stage, in order to minimize risk and to take advantage of diverse habitats. Traditional

institutions and tenural arrangements were used to regulate the use of natural resources.

Pastoralism as conservation strategy includes the different customary institutions and knowledge systems that are used by communities to manage their natural resources and to cope with adverse weather conditions and the knowledge these communities have of specific species of animals and plants and the strategies they have used to conserve them.

Some of the key government institutions that have a direct or indirect impact on pastoralism include the Ministries of livestock, natural resources and environment, local government, lands and the Kenya Wildlife Service. The significant changes in the land tenure systems of the ASALs have accelerated changes in the pastoralist production system, both negatively and positively. Some of the new government programmes that are affecting pastoralists include the Constituency Development Fund (CDF) and the Arid Lands Resource Management Project which is a Special Programme of the Office of the President. However, in some cases limited capacity of pastoralists to understand and take advantage of these programmes is a hindrance.

PASTORALISM AS A CONSERVATION STRATEGY AND CONTRIBUTOR TO LIVELIHOOD SECURITY

1. INTRODUCTION

Pastoralism, as a potentially sustainable form of land use and conservation in harsh and arid climates, is poorly and often misunderstood at national planning and economic levels. It is poorly understood because research and studies that have been undertaken rarely find expression in a policy context and rarely influence dry land policy and planning. Most such work stays in the realm of academia, with few exceptions.

Pastoralism is seen as a livelihood and livestock (or range management) strategy for the dry lands. Yet the underlying (and usually under recognized) reality is that pastoralism is a conservation strategy to make best use of dry lands both in space (in terms of large and extensive ranges) and time (to make best use of seasonal grazing) to help pastoralists secure their livelihoods in harsh and risk prone environments. This includes the importance of risk management and resilience enhancement. Even wildlife authorities tend to underestimate the importance of pastoralism as a conservation strategy, despite the fact that pastoralism is one of the few land use strategies that is compatible with wildlife conservation! If pastoralists livelihoods are going to be improved, and the degradation of dry lands reduced, then it is critical that pastoralism is respected and developed as a sustainable land use system. Pastoralism is based on natural resource management that respects the limitations imposed on such dry lands, the necessity for mobility, and which integrates the local knowledge and institutional systems of pastoralists. The over-arching influence for any pastoralist activity is the nature, security and complexity of people's livelihood strategies including such questions as:

- What goods and services are used, how and by whom?
- What are the trade-offs and indirect uses of natural resources, in the context of, for instance, agriculture and livestock rearing?
- What is the relative importance of spiritual, cultural and other "in-direct economic values"?
- What are reversible and irreversible coping strategies?

Apart from resource availability, the diversity of products and users is dependent on a wide variety of other factors. These include the proximity of resources, the existence of local markets, property rights and institutional controls, the intensity of use, household wealth status, education, availability of labour, alternative sources of products and incomes, the levels of livestock ownership, and cultural preferences. These factors can be grouped into the following areas:

- **Nature and value of the resource:** What goods and services are available, or not available? How is nature valued? An aspect of this is the changing markets for natural products, and the commercialization of resources;
- **Institutional arrangements:** What tenurial arrangements exist, both in policy and legislation, and the authority and enforcement structures which govern and underpin the various rights and responsibilities of stakeholders?; and

- **Macro-economic and inter-sectoral forces**, such as Poverty Reduction Strategies, HIV/AIDS, land reform, changing policies, legislation and macro-economic forces, and how they impact on livelihood strategies, resource use and stakeholder interests.

The World Initiative on Sustainable Pastoralism (WISP)

IUCN-EARO is implementing the World Initiative on Sustainable Pastoralism (WISP) on behalf of UNDP and with financial support from the GEF. Part of this project will involve literature review and the production of national and regional studies analysing past work on pastoralism. Policy briefs will be produced from these studies and used to lobby the relevant policy makers at national, regional and international level.

2. INTRODUCTION TO THE COUNTRY: KENYA

Kenya has a total area of about 582,650 Km² of which 13,400 Km², or about 2.3% is covered by water (CIA, 2006). According to the main system for land resource assessment, which is FAO's agro-ecological zoning (AEZ), Kenya's dry land mass is divided into six agro-ecological zones as follows;

Table I: Agro-Ecological Zones of Kenya

Zone	% Total
i) Agro-Alphine	0.1
ii) High Potential	9.3
iii) Medium Potential	9.3
iv) Semi-Arid	8.5
v) Arid	52.9
vi) Very Arid	19.8

Source: Godana, 2003

Approximately 83% of Kenya's land surface is classified as Arid and Semi-Arid, with the remaining 17% being classified as medium to high potential. These classifications are based mainly on average annual rainfall and evapo-transpiration, which are key determinants for agricultural production (Macharia, 2004).

Figure I: Agro-Ecological Zones (AEZ) for Kenya

Source: USDA, Foreign Agricultural Services, 2006.

The Pastoralists Lands

From the table above, virtually 80% of the country lies in the semi-arid to very arid zones, which are predominantly inhabited by the pastoralists and agro-pastoralists. Kenya's ASALs support about seven million people (20% of Kenya's total population) and more than 50% of the country's livestock population. (Godana, 2003). At present, the smallholder and pastoral system in the arid and semi-arid lands produce approximately 80% of all meat consumed in Kenya, which was until the 1970s dominated by large-scale ranchers (Herlocker, 1999). In addition, ASALs host a considerable proportion of the country's wildlife, with about 90% of the gazetted national parks, sanctuaries and game reserves located in the arid and semi-arid areas (Kigomo, 2001).

With rangelands being defined as uncultivated land that will support grazing and browsing animals (Herlocker, 1999), Kenya's rangelands are primarily in the arid and semi-arid lands where other land uses, such as agriculture, are not economically feasible but they may also include areas that have in the past or may in the future be used for cultivation or forestry. The main production system of the rangelands is pastoralism. The pastoral production system is defined as the system in which 50% or more of household gross revenue, including subsistence production, comes from livestock or livestock-related activities.

3. NATURAL RESOURCES AND FORMS OF LAND USE

Historically, Kenya has experienced significant changes in the composition of inhabitants, as the different ethnic groups moved through the continent, conquering new lands and peoples. For example, the Turkana people of northern Kenya are said to have entered the land they occupy from Sudan, through Kotein, Uganda about 1700 A.D. Before the 18th Century, the region of Turkana was inhabited by diverse groups of pastoralists, including the Samburu, the Merille (Dassenach) and the Rendille. The Turkana displaced these communities and expanded their territory by assimilating defeated groups and forcing others out of their land (IVP, 2006). Further changes were experienced during the colonial period, when land tenure systems were modified through the introduction of “official” land tenure regimes, including those for the privatization of land. These changes continued after independence, fuelled by the different policies and laws of post-independence governments. Kenya has also not been spared from the influences of global trends, especially those with regard to trade.

The pastoralists peoples and lands are situated within this dynamic context, which has affected, and continues to affect, the forms of land use systems, lifestyles of the peoples, values of the natural resources and indeed the composition of the vegetation and animal life within the dry lands. Other influences that have significant impacts on the dry lands, though not so clearly understood, include global and local climate changes.

The map below shows the distribution of the different ethnic groups of Kenya.

Figure II: The Distribution of the Peoples Kenya:

Source: Were & Wilson (1968)

The Changing Face of Pastoralism

It is estimated that Kenya has 12 million cattle, 19 million sheep and goats, 875,000 camels, 18 million poultry and 114,000 pigs. Of these, the ASALs support 50% of the cattle, 55% of the goats, 75% of the sheep and nearly all the camels (Kigomo, 2001).

Figure 3: Kenya’s Production/Livelihood Systems

Source: USDA, Foreign Agricultural Services, 2006.

The people in the ASALs are mainly pastoralists, who derive their livelihood from keeping livestock, which are also a symbol of social status. Several factors have contributed towards the changing land use patterns in the pastoralist areas and the traditional grazing patterns. These include changes in land tenure, changing lifestyles, policies aimed at making pastoral communities more sedentary, in migration of agricultural communities into the dry lands and the greater commercialization of the commodities, including livestock, of the dry lands.

Pastoralists have made changes in response to the changing conditions and realities. The trends indicate that pastoralists are becoming more sedentary, as they take advantage of permanent water sources. Sending children to school has reduced the

availability of labor and therefore the effectiveness of herd management. Traditional institutions and social cohesiveness, which once helped pastoralists regulate natural resource use and survive periods of stress, are being eroded (Haro, 2006). However, these traditional institutions continue to play a significant role in the use of natural resources and their conservation. According to Karanja, et. al. (2002) among the Loita Maasai, only the *Laibons* (traditional seers and medicine men) are allowed to use certain sacred resources such as the Oltukai (*Phoenix reclinata*) which is used for cultural ceremonies. Certain traditional rituals are carried out within the forest, and require the use of limestone, which is found in very few parts of the forest. Conducting of these ceremonies are carried out deep within the forest, for instance *Enkitainoto Olorrip Olasar lolporror* – the chosen spiritual leader of the new age group. It is only these age-group spiritual leaders who know where this special limestone is located within the forest, and the actual site where these ceremonies are conducted. The Loita Maasai community understands and respects this, their spiritual leaders, and the whole ceremony is greatly revered by all. However, in some areas, customary institutions and social cohesiveness, which once helped pastoralists survive periods of stress, are being eroded. For example, according to Woodhouse, et. al., 2000, customary institutions of resource access among the Maasai in Loitokitok division of Kajiado district have been systematically weakened by public policy, and richer residents as they increasingly seek to acquire land by purchase or by fencing group ranch land.

Lack of security, especially due to the increased supply of small arms from the political conflicts in the region, has also limited the extent of rangeland that can be used by pastoralists. In order to take advantage of markets, pastoralists are getting concentrated around urban areas, where they can access markets for their milk and stock. Pastoralists are also being forced into farming, often on marginal lands, wage employment in urban areas and dependence on famine relief. At the same time, a smaller class of wealthy and politically powerful pastoralists is also forming (Herlocker, 1999). According to Haro (2006), presently, about 75% of the Rendille and Ariaal pastoralists of Marsabit District are settled, with the settlement centers carrying up to 40% of their total livestock population. Some of the factors that have resulted in the greater sedentarization of these pastoralists include the Dixey Water Development Scheme of the 1950s, the post independence Shifta War of 1967 and the droughts of 1969, 1971, 1973, 1979 and 1984.

Further, the type of livestock kept by pastoral communities has also seen a gradual change, from indigenous breeds, such as the *Borana* and *zebu* cattle, to cross-breeds of these with exotic breeds. The pasture and water requirements of these cross-breeds are different from the indigenous breeds, as is their resilience to disease and to adverse climatic conditions, such as drought. The attributes of indigenous breeds, such as resilience to drought and disease, has resulted in there being a demand for these genetic traits, which supports an export market for embryos of *Borana*, and other indigenous breeds such as the Ankole of Uganda, from Kenya to the southern Africa region, for example through the Ol Pajeta Ranch in Laikipia District (pers. comm. Ol Pajeta Ranch Manager, 2005). Additionally, through government and NGO programmes, certain livestock have been introduced into communities that did not traditionally keep them. For example, some Samburu and Maasai now keep camels, which they did not traditionally do.

Eastern Africa possesses a diverse array of indigenous livestock. This large number is the result of the interaction between natural/environmental and human/artificial selection. Tribes living in different parts of the region have, over time, selected for livestock on the basis not only of survival and productivity but also other features such as appearance. Many of the resultant breeds bear the name of the tribes who developed them: Toposa, Turkana, Boran, Sukuma, Bahima, Ankole, Somali, Maasai and so on. This reservoir of genetic material is important to present-day livestock development, because use of locally adapted breeds reduces the need for veterinary care and also through cross-breeding, they enable imported breeds to become locally adapted. Presently, the improved or Kenyan Boran cow is one of Africa's top beef breeds producing carcasses suitable for the export market. The Sahiwal, which originates from the arid regions of India and Pakistan, is the only exotic *Zebu* type imported into eastern Africa that has been improved and multiplied in large numbers, especially in Kenya. Kenya is, today, Africa's major source of Sahiwal stock and semen. The Sahiwal is a high milk producing breed, with the bulls being the commercially most important breed used for beef production. It shares the qualities of other *Zebu* breeds of being able to thrive on low quality, high fiber forage and as a consequence, cross breeds of Sahiwal are widespread, especially in semi-arid and arid rangelands (Herlocker, 1999).

Despite many set-backs, Kenya's livestock sector is said to be growing and it currently contributes over 10% to the country's GDP. Although it is difficult to separate the contribution of pastoralism to the national livestock sector, it is significant because over 50% of the country's livestock population is based in the ASALs, with most of the livestock slaughtered in major urban centers today originating from these areas (GoK, 2003).

In 2005, Kenya exported beef cattle and sheep worth over Ksh. 380 million (about US \$ 5.3 million) to Mauritius; while in April 2006, the country signed a Ksh. 55.6 million deal (about US \$ 780,000) to export heifers to Rwanda, with each heifer being bought at Ksh. 100,000 (about US \$ 1,400). Although it failed to clinch a deal to acquire Uganda's Dairy Corporation, Brookside Dairy Limited, one of Kenya's leading dairy processors, has opened a branch in Arusha, Tanzania and expects to spread further across the region. It is also expected that with the re-opening of the Kenya Meat Commission (KMC) in June 2006, since it was closed in 1986, will open up increased opportunities for livestock keepers. KMC will have improved capacity to slaughter 1,000 heads of cattle per day. Industry analysts have observed that 1,000 cattle a day is a huge number for the Kenyan livestock industry and could lead to depletion of livestock within a few years, unless the country seeks supplies from other markets in the region. Since Kenya lies within the cattle corridor that includes countries in the Horn of Africa and East Africa, observers say that countries like Somalia, Ethiopia and Sudan could be suppliers of cattle in the future (Ouma, 2006).

Tourism and the Dry lands

The highest population, density and diversity of Kenya's wild fauna is found in the dry zones of the country and about 90% of the over 50 gazetted national parks, sanctuaries and game reserves are located in the arid and semi-arid areas (Kigomo, 2001). Approximately 8% of Kenya's landmass is protected, which includes 22

terrestrial national parks, 28 terrestrial national reserves and five national sanctuaries. There are also four marine national parks and six marine national reserves (KWS, 2005).

Pastoralism is one of the few forms of land use that is compatible with wildlife-based tourism. Indeed, it is the pastoralist lifestyle that has made it possible for wildlife to continue thriving in large numbers in the dry lands of Kenya. According to Aveling et. al. (n.d.), although some recent publications and advocacy groups stress that wildlife conservation has robbed pastoralists of a significant part of their traditional range, with the pressure from various other forms of land use increasing, especially settled agriculture and subdivision of pastoral lands, pastoralists and wildlife managers in East Africa are finding themselves forced into an uneasy alliance. The reason for this is that pastoralism and wildlife both have *first-order conflicts* (fundamental incompatibility) with intensive agriculture, whereas they only have *second-order conflicts* (some constraints to compatibility) with each other (Aveling et. al. n.d.). The attitudes of pure pastoralists versus pure cultivators reflect the differing sentiments towards wildlife. One study revealed that, of the pure cultivators sampled from Transmara District, 76% were of the opinion that killing of wild game would be the most effective control method as compared to 34% and 57% for pure pastoralist and mixed landuse, respectively, who felt the same. Further, 72% of the cultivators supported poaching and 55% of the respondents who felt that wildlife was doomed to extinction belonged to this category (Salaton, 2001).

In the past, the setting aside of land for wildlife has mainly been done by the government. However, there is a growing phenomenon whereby private landowners and community groups are setting aside part of their land as game sanctuaries and conservancies. Group Ranches that have set aside land for such purposes include Elerai, Koiyaki, Kamana, Eselenkei, Lumo and several group ranches that border the famous Maasai Mara National Reserve. Some of these communal ranches are zoning their land, following rigorous community land use planning sessions. The figure below shows how the Elerai/Entonet Individual Ranches Association in Loitokitok Division of Kajiado District has zoned its 22,000 acres of land, of which 4,975 has been set aside for wildlife conservation and tourism infrastructure development. This communally owned ranch was formed following the sub-division of a group ranch and the subsequent consolidation of the land that was allocated to eight brothers and their children.

Figure IV: Elerai Group Ranch Land Use Map

In addition to the threat of reduced habitats for wildlife, another key threat to wildlife conservation is the bush meat trade. This trade is fueled by the inability of the Kenya Wildlife Service to protect the wildlife that is under its jurisdiction, poverty levels which result in wildlife being a key, and in some cases the only source of protein, and a feeling of alienation by local communities from the management of wildlife because they accrue minimal tangible benefits, while continuing to bear the costs of having wildlife in their midst.

Agriculture within the dry lands

According to Kigomo (2001), about 10 million hectares is estimated to fall under the farming form of land use, mainly in medium and high potential land areas. The rate of expansion of agricultural land during the last decade has been about 100,000 hectares per year. This land has come from forest land but more so from the woodland vegetation types. The threat to the dry lands is significant because larger areas need to be cleared to be able to support the same level of agricultural production as in the more arable areas. Furthermore, even when the land is left fallow, its recovery rate is slower. The fallow period tends to become shorter as more people continue to migrate into the drier areas of the country. Narok District provides a stark illustration of the devastating effects of large scale agriculture on the fragile dry land ecosystems. Large areas that were cleared of the natural vegetation to pave way for wheat production are later abandoned, especially as wheat production ceases to be lucrative. According to Salaton (2001) the large commercial farms that dotted Kirindon and Lolgorian division of Transmara district in the earlier part of this decade have been abandoned because of the high cost of keeping away wild animals, especially elephants.

Complete clearing is done of the natural vegetation, in order to facilitate the use of machinery. Therefore, not even those indigenous trees¹ that were traditionally left behind during such clearing of vegetation, are left standing. Following intensive wheat production, usually by commercial wheat farmers who lease the land from the indigenous populations, the land is returned to the owner. Unfortunately, these areas are remaining barren for long periods, especially as the top soil is eroded by wind and water and the residual effects of farm chemicals impede the growth of grasses and shrubs.

Within the dry lands, agricultural activities are also found along rivers and at permanent sources of water, such as springs. Since these are also the traditional dry season grazing areas for pastoralists, the result are clashes between them and the cultivators. Such clashes are frequently experienced along the Tana river, between the pastoralist Oromo and the agriculturalists, Pokomo tribes, especially during prolonged periods of drought.

¹ According to Kigomo (2001), certain tree species are left behind after clearing vegetation for cultivation purposes and are valued as component species in the dry land farming system in northern Kenya. These include *Faidherbia albida*, *Erythrina abyssinica*, *Balanites aegyptiaca*, *Adansonia digitata*, *Acacia tortilis*, *Acacia nilotica*, *Terminalia brownii*, *Melia volkensii* and *Phoenix reclinata*.

Timber and Non-Timber Products in the Dry lands

Dry land vegetation is a source of a diverse range of timber and non-timber products. In some cases, the exploitation of dry land vegetation is happening at an alarming rate, while its contribution to alleviating the poverty of pastoral communities is minimal. Below are some key products from the dry lands.

Charcoal: Due to restriction on harvesting of trees from government forests, national parks and within people's farms, the dry lands are increasingly providing the key urban areas with charcoal. Further, dry land tree species produce high quality charcoal, that burns for long, with few sparks and smoke. Ministry of Energy estimates indicate that Kenyans consume an estimated 2.4 million tones of charcoal per year, with the industry generating Ksh. 23 billion (Ecoforum, 2002). There is said to be a growing export market for charcoal from the Kenyan dry lands to the Middle East, although those involved in the trade are reluctant to be quoted (pers. comm. with a charcoal exporter, 2002). Some of the key sources of charcoal are former communal cattle ranches, especially along Mombasa Road, sub-divided group ranches in Kajiado, and land that is leased to wheat farmers in Narok district, whereby the process of clearing the land for cultivation includes the production of charcoal.

Firewood: In addition to meeting the energy needs of most pastoralists communities, firewood has gained prominence as a commercial product especially around the refugee camps of Dadaab in Garisa and Kakuma in Turkana. The United Nations High Commission for Refugees (UNHCR) issues lucrative contracts for the supply of firewood to these camps. According to a report commissioned by the Garisa County Council, under whose jurisdiction Dadaab falls, there were many indigenous trees in Dadaab, and it was a good place for grazing goats and camels. However, when the refugee camp was established, in 1991, the hugely increased demand for firewood and building materials has had a devastating effect on the fragile environment (Maliti, 2003).

Gums and resins: The dry lands of Eastern Africa are a source of gums and resins that are used locally and also exported. Gum Arabic, which is produced by *Acacia senegal*, is used as a food supplement and is also said to ease joint and back pains. Myrrh, which comes from *Comiphora spp.* trees is used by pastoral communities to treat wounds, boils and a wide range of stomach disorders. When burnt, its smoke acts as a repellent to scorpions, snakes and irritating insects. Gum hagar, another resin, is used locally to treat a variety of ailments, including mange, scabies, foot rot and eye infection. Gum hagar is also used for snake bites and as disinfectant for wounds (ELCI, 2005). Wajir and Mandera are the only districts in Kenya where myrrh, the most valuable of the Kenyan commercial resins, is harvested, and most of the hagar comes from here (Curry, 2000).

Frankincense, which is also known as Olibanum, is produced by *Boswellia* species. It is used in the treatment of a broad range of ailments, such as asthma, ulcers, aging, allergies, snake and insect bites and stomach disorders. Among the Samburu, it is also used during the circumcision ceremonies (ELCI, 2005).

Medicinal plants: Despite the fact that the climate in the dry lands is generally hot and dry, with soils that are considered poor, in that they are characterized by high

sand content, low water content and low natural fertility (Kigomo, 2001), these areas contain a wide variety of useful plants, many of which have medicinal properties. The use of herbal remedies, both for human and animal health, is deeply rooted in the communities' traditions and customs. The limited availability of conventional medicines within these areas means that the importance of herbal remedies has continued to grow. The HIV/AIDS pandemic has also resulted in a refocusing on herbal remedies, especially to manage opportunistic infections and also due to the lower toxicity of these remedies when compared to conventional drugs and anti-retroviral therapies. The commercialization of traditional remedies, especially when they are "discovered" by outsiders has increased pressure on the respective plants that are targeted, in some cases almost to the point of extinction. Currently, the global market for traditional therapies stands at over US \$ 65 billion a year, and is steadily growing (Mukiama, n.d.).

Rangeland plant species are an important source of local human and veterinary medicines. For example the Borana of Kenya and Ethiopia use at least 100 plant species for medicinal purposes. Kokwaro recorded approximately 1,280 species used for traditional medicine within Kenya, Uganda and Tanzania. (Herlocker, 1999)

According to Barrow (1996), pastoral Pokot knowledge of local flora almost totally applies to its values for livestock and for people. Out of 307 plant species, 61 (20%) were used for food and 118 (39%) for medicine. Their knowledge of fodder is particularly well-developed; they can recognize species that will promote milk production or meat production or provide dry-and wet-season fodder, and fodder for different stock species and ages. The Pokot attach great value to trees and will rarely fell a valuable one. Trees are used on a sustained basis for a variety of things including fodder and food, medicines, building materials, fuel and fencing as well as acting as central meeting points for elders and providing shade. During the dry season some trees will be pollarded (i.e. to cut off the branches at the top of the tree so that the lower branches will grow more thickly), for their browse, such as *Balanites aegyptiaca* and *Dobera glabra*. Pods will be harvested from other trees to feed livestock, for example *Acacia tortilis* and *Faidherbia albida*. The only woody tree actually cut back are the less useful bush species, for example *Acacia reficiens* and *Acacia brevispica*, which are used for fencing the homestead and livestock enclosures. This cutting back leads to better ground cover of perennial grass.

Below are some multiple use plant species of the dry lands.

The Baobab (*Adansonia digitata*)

Popularly known as the Upside Down Tree, the baobab (*Adansonia digitata*) is an economically, medicinally and culturally important Eastern Africa tree. Almost all parts of the baobab are used in one way or another. Its trunk is used by the Kamba and Taita to store water. The inner bark is so strong that it is used to make ropes, musical instruments, baskets, snares, fishing lines, fibre cloths, batiks and mats. The dried bark is exported to Europe under the name of *cortex cael cedar* for use in manufacturing packaging papers. The bark is used in treatment of fevers, a mouthwash for toothache, in preparing soap, as a diaphoretic (which produces or increases perspiration), antiperiodic (which prevents the periodic return of a disease or fever), antidote to stophanthus poisoning (stophanthus is a plant) and in extracting

tannins. Baobab leaves are used in the treatment of kidney and bladder diseases, diarrhoea, guinea worm sores and ulcers and are also good livestock fodder. The fruit is used to treat dysentery, smallpox and malaria and the roots produce a soluble red dye (Herlocker, 1999).

However, perhaps the most important use of baobab is as food. Its young leaves are a popular spinach and they are sometimes dried and powdered and made into soups and sauces. The fresh leaves are rich in vitamin C. The gourd-like fruit, 55% of which is edible, is perhaps the most important part of the tree as it is very nutritious; the seeds are eaten raw or roasted. The pulp is used to make juices. The fruiting season of 2-3 months and a fruit shelf life of about the same time makes the baobab an important source of food during critical times (Herlocker, 1999).

A report entitled “Out of Africa: Mysteries of Access and Benefit Sharing” by the Edmonds Institute (McGown, 2006) indicates that the German company Cognis has obtained patents in many countries (starting with France in 1997) for use of baobab leaf extracts in cosmetic products. Cognis’ “invention” is to use the baobab leaf mucilage as a soothing cream. But baobab has a wide variety of traditional medicinal and other uses in Africa, including use of the leaves on the skin. Therefore, it seems most unlikely that Cognis was the first to discover the soothing effects of baobab mucilage when applied to the body (Heong C. Y., 2006).

Acacia tortilis

This is a very, if not the most, important tree in the drylands. It grows to about 20 meters high, and often has the top flattened into an umbrella shape. The pods are numerous and twisted, which is characteristic of this tree. The tree grows faster than most other dry-area tree species, provided that it is protected from browsing, and can grow in a wide variety of soils, especially deep sandy loams close to rivers and can withstand slightly saline soils. *Acacia tortilis* is a pioneer species on new ground and can regenerate very well by seed. It performs an important role in subsistence strategies of many pastoralists. During the dry season both people and stock spend a considerable portion of the day in the shade of riparian woodlands which may be dominated by *Acacia tortilis*. Small *Acacia tortilis* branches are cut for construction, which dead branches and trunks of large trees are major fuel sources. Live trees are conserved for shade and as a food source (Barrow, 1996).

The pods are a valuable food for livestock, and in some areas are collected and sold. It is also an important food in certain societies, particularly for household economies in dry or drought times. People remove seeds from pods, crush the pod and mix the resulting flour with milk or blood before eating. Alternatively, the flour mix is dried and stored for the dry season. Because the tree is a legume, the flour from the pods has a high nutritional value, particularly protein. Branches are used for furniture, bark for thatching, fibre for ropes, wood for fuel, and flowers and leaves are excellent fodder for camels, sheep and goats. Because the timber is hard, this tree produces very good-quality charcoal and fuel-wood. Poles and posts are used for construction and fencing. Sometimes branches are cut for fodder, mainly from the large trees. Since it is a leguminous tree, it fixes nitrogen and so helps fertilize the soil (Barrow, 1996).

The roots are flexible enough to be used in making houses. A powder made from the roots is used to cure certain skin diseases, and the wood for making camel and donkey saddles (Barrow, 1996).

Livestock are often blamed for environmental degradation of rangelands. However, in some areas, for instance Trukana in Kenya, livestock can be responsible for enhancing the regeneration of *Acacia tortilis*. Here the livestock concentrate the seeds along with faecal and urinary nutrients in temporary corrals which subsequently become dense acacia plantations which thin out with time as individual plants enlarge. Some livestock kraals effectively become nutrient-enhanced seed banks that may germinate over periods of one to five years after abandonment of the enclosure. Following establishment and growth, some young trees may be cut for corral and house construction. Surviving are trees that germinate under, and are protected by, the abandoned kraal fencing. The seedlings not protected quickly get eaten, leaving behind a ring of trees! (Barrow, 1996).

Acacia senegal

This is a small tree or shrub up to 12 meters tall, which occurs locally throughout the Eastern Africa region. The species is highly valuable and about four varieties have been distinguished on the basis of habitat, inflorescence hairiness, pod shape and leaf size. It is normally found in wooded grassland and bushland, preferring well drained soils. It is the main source of gum arabic. In northeastern Kenya, gum arabic is important to the rural economy. Production of gum arabic for use as a stabilizer in food and paper industries is potentially an important source of foreign exchange. Sudan for instance, earns an average of US \$ 50 million annually from exports of the gum. Gum arabic is also edible, and in addition, the tree is an important fodder species as the pods and leaves are palatable to animals. The bark, leaves and gum are used to cure diarrhoea, haemorrhage, ophthalmia and colds. Other parts of the tree are used to prepare emollients (preparations having a soothing effect on body tissue) and astringents (which contract the blood vessels, checking the flow of blood) while the gum is used as an aphrodisiac. The tree is a source of fuelwood and fiber and is used to make throwing sticks, well linings and tool handles. It is grown as an ornamental and windbreak as well as to stabilize sand dunes and other forms of soil erosion. It is also planted to increase honey production (Herlocker, 1999).

Table I: Some Multiple Use Tree and Shrub Species

Uses	<i>Acacia tortilis</i>	<i>Balanites aegyptiaca</i>	<i>Sclerocarrya birrea</i>	<i>Tamarindus indica</i>	<i>Zizyphus mauritiana</i>
Firewood	X	X	X	X	X
Charcoal	X	X		X	X
Timber/furniture	X	X	X	X	X
Poles/posts	X	X		X	X
Fodder	X		X	X	X
Bee forage	X		X		X
Shade	X	X		X	
Nitrogen fixation	X				
Soil conservation	X				X
Fibers/rope	X				
Tool handles	X				
Carvings		X	X	X	X
Food/fruit/nuts	X	X	X		

Medicine		X	X	X	
Mulch		X		X	
Windbreak		X			X
Gums/resins/latex	X			X	
Live/dry fencing	X			X	
Shingles/bee hives		X			
Boat building				X	
Ornamental				X	

Source: Herlocker, 1999

Aloes

These are a large group of succulent plants found in the tropics of Africa and Madagascar that flourish in a variety of climates and on the poorest of soils. Aloes are well known for their curative properties utilized by a diversity of cultures for a diversity of ailments, the best known being in the treatment of wounds and burns. The commercial harvesting of aloes has rendered the genus vulnerable and hence earned it CITES protection. One of the first records of the medicinal uses of Aloe is in the ancient Egyptian scrolls, the Papyrus Ebers written in 1500 BC. There is evidence that nomadic tribes in Africa dug up and replanted their aloe plants as they moved from place to place, to ensure continued access to this marvelous plant. Aloe extracts are used to remove pests from animals and today, many animal shampoos have aloe ingredients to control pests (Mukiama, n.d.). Despite the existence of a 1986 presidential decree banning the commercial harvest and export of aloes, the international trade continues. Aloes are valued for use in cosmetics and healing lotions (Marshall, N.T. 1998).

Sandalwood

The Sandalwood tree (*Osyris lanceolata*) is an evergreen shrub or tree that grows up to 1 – 6 meters tall and that takes about 20 years to mature. It has blue green to yellow greenish leaves, yellow-green tiny flowers and round orange or red fruits that are edible. The tree is mostly found in the arid and semi-arid areas of Amboseli, Chyulu Hills, Taita Hills, Ngong Hills and Mbeere. Sandalwood is valued for its essential oils, which are used in the making of perfumes. The female plant is preferred over the male, as it is said to have better quality of heartwood and the red dye. Intense sandalwood exploitation started in 2000 and has since picked up and spread from private and communally held land, with poachers now targeting national parks and reserves. From April – December 2005, KWS made 179 arrests and recovered about 180,000 kgs of Sandalwood with a market value of approximately Ksh. 14.5 million – of which only about Ksh. 0.9 million goes to the harvesters. The Kenya Forestry Research Institute (KEFRI) is spearheading research on propagation methods, with the aim of reducing pressure on the remaining wild trees by promoting the commercial growing of the tree (KFWG, 2006).

Seeds

There is a growing market for seeds of indigenous trees, generally, and specifically those from the dry lands. Limited research on the propagation properties of dry land species, especially by the key government research institution, the Kenya Forestry Research Institute (KEFRI) has resulted in the growing demand for indigenous tree seeds and seedlings not being met by the available resources.

Other Products

Other products that are used both for subsistence and also commercially include honey, which is a major product of the dry land. Natural salt deposits are dug up and sold to livestock keepers, for example by the side of the road along Lake Elementaita. Additionally, there is a growing market for pasture, either in the form of hay bales or at a grazing fee that is calculated per number of livestock per month or by the acreage of pasture to be grazed over a certain period.

Introduced Species

The role of some key species that have been introduced into the dry lands of Kenya is significant for several reasons. In some cases, the local communities are taking advantage of the many uses of these exotic species, while in other cases, the plants are considered a nuisance and invasives. Below are two key plant species that have been introduced and that have spread extensively in the dry lands.

Neem

Neem, *Azadirachta indica* A. Juss, belongs to the mahogany family, Meliaceae and is native to India, Burma and Malayasia. This tree has been introduced to many countries, including Kenya, where it has become adapted. It can tolerate temperatures as high as 49 °C. Although it is found mainly on sandy soils, it does well on black cotton soils and performs better than most other species on dry, stony, crust-forming clays and shallow soils. Various parts of the plant are used as food in various parts of the world. Livestock in Asia eat neem seed, while the leaves are fed to camels. Neem wood is heavy, tougher than teak and is durable, even in exposed conditions. Almost all parts of neem are bitter and are used in indigenous medicine. Neem is planted as a windbreak and is effective as a wind erosion control in sandy areas. In Kenya, neem was probably introduced by Indian immigrants and spread by officials working for the colonial administration, such as foresters. Currently, it is found along the coast, in the arid lands of the Rift Valley, such as the Perkerra Irrigation Scheme in Marigat, Baringo district, Magadi, Bogoria, Garisa, Kina and Garbatulla, Tharaka, Siaya and Kisumu (Mukiama, n.d.).

Prosopis

Prosopis juliflora is a fast growing thorny tree species that is found in many dry areas of Kenya. The plant was introduced in the 1980s by the Government in collaboration with several agencies, including FAO. The objective of introducing this plant was to curb soil erosion and rehabilitate the dry lands. Since its introduction, the plant has spread extensively with some communities calling on the government to get rid of it as they consider it an invasive. One community group in Marigat, Baringo District has instituted a court case against the government, claiming that the plant is a danger to them as it suffocates pastures and kills livestock. However, literature from around the world indicates that this plant has many uses, not only in its countries of origin which include Mexico, Central America and the southern part of the US, but also in places

where it has been introduced. These uses include the use of the pods as a livestock feed supplement, which are also ground into a flour that is used for making cakes for human consumption. The tree produces high quality charcoal and timber, while the tree itself has contributed to controlling dust storms that were a common feature in some of the places it has been introduced. In Kenya, *Prosopis* is common in Garisa, Bura, Taita Taveta, Baringo and Turkana districts. The National Museums of Kenya, KEFRI and the Forest Department are conducting surveys and an awareness raising campaign to popularize the many uses of *Prosopis*.

Emerging Policy Trends for the Pastoralist Land Use Systems

There is now more official acknowledgement that pastoralism has been ignored or poorly understood by previous governments, which has in turn resulted in the further marginalization of communities living in the ASALs. For example, according to the Ministry of Lands and Planning (2005), in the 2001 Poverty Reduction Strategy Paper (PRSP) of 2001, one of the causes of increased poverty in the country is the limited support provided by the State to the pastoral livestock production system. Therefore, although “commercial farming, small scale subsistence agriculture and large-scale ranches have enjoyed the benefits of sustained land use planning and support by the State through extension services, market outlets and access to credit by financial institutions, this has not been the case for livestock development by pastoral communities which has not been recognized as an economic activity. This area is currently commanding a lot of public interest due to the challenges facing these communities during times of drought and the vulnerability of these communities to poverty and food insecurity.”

The Government’s Economic Recovery Strategy for Wealth and Employment Creation (GOK, 2003) states that one of the major problems in the past has been the little involvement of the local communities in the ASAL areas in tourism development initiatives, in addition to lack of adequate motivation for these communities to conserve natural resources. Proposed strategies to redress this situation will include allocating a larger portion of the revenue generated from game reserves and national parks to community projects and supporting community based wildlife conservation and other approaches through which wildlife can benefit pastoralists directly so as to motivate them to conserve and accommodate wildlife in their production systems.

Political good will is an important starting point, which has the potential of promoting innovative strategies for building upon the many ways that pastoralism contributes to conservation, while enhancing the economic benefits that accrue to the pastoral communities.

4. PASTORALIST NRM STRATEGIES

The use of all natural resources, including pasture, fodder crops, water, salt licks and medicinal plants, needs to be regulated. In traditional societies, there were rules governing the use of these resources. Failure to regulate the use of certain resources results in their degradation and in some cases increased scarcity and extinction.

The section below highlights some of the negative impacts of failure to regulate the use of natural resources necessary for the pastoralist production system.

Over-harvesting: Harvesting of whole tree/shrub for fodder may result in reduced population of the targeted plant.

Destructive harvesting practices that affect medicinal plants include the removal of bark around the tree, which results in the drying up of the whole tree. In other cases, whole trees are felled and stripped of their bark, especially when it is of high commercial value, such as that of *Prunus africana*.

Selective harvesting: The removal of certain species of plants can have adverse effects on the non-targeted species, such as by reducing the shade, support or nutrients needed for other plants to thrive. Animal diversity is also directly and indirectly affected by changes in the diversity of plants.

Use of Fire: In traditional pastoral communities, fire was used to control ticks, to promote the regeneration of grass and to suppress the growth of woody vegetation. However, if not well regulated, fire can result in irreversible loss of biodiversity and result in soils that take much longer to recover and support plants. The use of fire also encourages the growth of species that are adapted to burning, such as those with thick bark or with dormant buds beneath the soil which sprout after the tree is burnt, such as *Acacia spp.* (Herlocker, 1999).

Fires are especially common during the dry seasons and during drought periods. According to Kigomo (2001), the incidence of forest fires is very high during the drought periods, with about 10,700 hectares of plantations and natural forests being lost annually as a result of fire, which translates into a loss of US \$ 505,000 for the Forest Department when the loss of forest produce and costs of suppressing the fires are added up. However, although the incidence of fire in the dry lands is higher, the costs have yet to be computed for Kenya, because timber production is not a priority in the dry lands.

According to Herlocker (1999) the use of prescribed, controlled burning continues to be a potentially valuable tool in the management of rangeland vegetation, livestock production and wildlife habitat within eastern Africa.

Over-grazing: The degree of grazing strongly affects the structure, composition, quality and productivity of rangeland vegetation. Un-grazed perennial grassland accumulates dead material, less nutritious grasses and woody plants, because unless periodically defoliated many grasses lose vigor and die early, thereby becoming less effective competitors against woody plants. On the other hand, light to moderate levels of grazing actually maximize both primary and secondary production and encourage perennial grassland at the expense of woody vegetation. However, overgrazing reduces ground cover, plant height, forage quality and productivity and eventually, woody vegetation may become abundant. The effects of over-grazing can be seen in some parts of northern Kenya (Herlocker, 1999). If heavy grazing is done in short bursts, with a long lay off period, this seems to be an effective pasture management system. However, heavy grazing for a sustained period can be damaging.

Overgrazing can result in the dominance of unpalatable species of grass, which can only be changed to more productive use by the application of major capital inputs, such as clearing, plowing and reseeding. This has happened in some parts of southwestern Kenya. In some cases, destruction of grasses that occurs during drought makes them not return even under improved rainfall conditions. Continued long term over use of a rangeland site often leads to soil erosion which can so alter the fertility and soil-water status of soils, and remove seed banks, that they will no longer be as productive as they originally were (Herlocker, 1999).

Customary Natural Resource Management Strategies

All pastoralist communities had evolved a range of traditional natural resource management strategies that were deeply rooted in the customs and institutions of the different ethnic groups and that were in response to the specific ecosystems and resources within the natural environment. Some of the key management strategies included the use of mobility to maximize on the available natural resources. Therefore, nomadism among pastoral communities was a key form of traditional natural resource management strategy. These communities moved along traditionally defined routes, which included wet and dry season grazing areas. Sanctions were imposed on those members of the community who went against laid down rules on natural resources, usually by the elders.

Territories were defined by each of the ethnic groups but sometimes overlapped with those of neighbouring groups. For example, in Marsabit District, the traditional inhabitants were the Rendille and Ariaal pastoralists. Rendille keep more camels and goats, while the Ariaal keep more cattle. The home range of Ariaal included the areas of Ngurunit, Ilaut, Laisamis, Merile, Loglogo, Karare and Songa, while that of the Rendille included Korr, Kargi, Balesa, Kulal, Hedad and Loglogo. During the colonial period, grazing borders separating communities were fixed, and it was a major occupation of colonial administrators to maintain these borders in order to prevent conflict over resources. However, this control interfered with spatial mobility and resulted in ecological, political and economic problems (Haro, 2006).

Specific species of plants and trees were conserved and managed through traditional forms of tenure and also through the belief systems. Examples include the *Acacia tortilis*, which were managed by the Turkana through a tree tenure system called the *Ekwar* (plural *Ngikwalin*). This system was associated with ownership of *Acacia tortilis* and its pods besides or near rivers, being particularly important as dry season grazing. The riverine trees were divided into plots owned and managed by household heads. When the household head died the plot management was left to the eldest son. Non-owners of the *ekwar* were allowed to pass through the *ekwar*, even with their livestock and to pick pods that had been dropped by the wind, but not to shake the tree for pods, without permission from the owner. The family's wives owned kitchen gardens in the *ekwar*, and used water from the river to water their crops of sorghum, and cow peas, that were used to supplement their diet of milk and meat. The open plains were managed through zoning and differed grazing, that is referred to as *epaka*, that was organized and supervised by the council of elders (*Ekitoe Ng'ikasukou*). Differed grazing allowed regeneration of pastures by giving the land a chance to recover. Some of the taboos and superstitions that resulted in the protection of certain species include the belief that birds with red eyes, such as the Secretary Bird, were a

bad omen; different owls were also feared while nightjars and ground hornbills were valued because they were considered to be rainmakers, which informed the community when the rains were about to arrive; the honey guide helped in locating honey, while the wood pecker was believed to be able to detect and inform a traveler what was ahead of them (IVP, 2006).


Among the Rendille and Ariaal of Marsabit, hand dug wells were considered the private property of an individual or clan, to be passed on from father to son, but use was communal. During the dry season, a schedule of water use was arranged and users were required to regularly maintain and protect the well (Haro, 2006).

5. PASTORALIST INSTITUTIONS FOR NRM

Customary Institutions for Managing Natural Resources

The different communities had evolved traditional institutions for regulating the use of natural resources. These institutions were part and parcel of the broader social, spiritual and political institutions within the community. For example, the Turkana community managed their pastures by zoning them into dry and wet season grazing areas and the application of rotational grazing systems. Using their knowledge of the seasons, they migrated using territorial migratory routes. In the dry season grazing areas along the rivers, the community shared blocks of *Acacia tortilis* trees, and they respected each other's user rights (Indigenous Vegetation Project, 2006). The different institutions for managing natural resources included councils of elders, grazing management committees, age-sets/groups that were charged with different responsibilities, such as the warrior group that looked after livestock far from the homesteads. All these different groups were governed using the respective customs, traditions and religions of the different ethnic groups.

Historically, access to natural resources in Maasailand was secured through complex institutional arrangements based on geographical territories, a socio-political age-grade system and kinship. The figure below illustrates the hierarchy of resource management organizations that can be identified with the Maasai society.

	Largest	Maasai society Ideological unit, shared language and culture, limited access to non-Maasai except through trade/labour arrangements
		Section (<i>olosh</i>) Largest unit of grazing management, compensates for variations on resource availability, freely accessible, <i>de jure</i> , to all members of the section. Reciprocity between <i>iloshon</i> common
		Locality (<i>enkutoto</i>) Broader cooperation on the use, regulation and management of water, pasture and other natural resources locally
		Boma (<i>enkang'</i>) Cooperation in the joint pasturing and watering of livestock. Emphasis is on food sharing
	Smallest	Household (<i>olmarei</i>) Locus of cattle ownership

Source: Woodhouse et. al. (2000).

The Maasai's culture has a lot of aspects which enhance conservation. An example of such attributes is the fact that they hold wild animals in high esteem and believe that when God created domesticated animals, He also created the same of each to live in the wild. Accordingly, the goat is equivalent to the Thomson gazelle, the donkey to the zebra, cow to eland and the dog is equivalent to the wilddog. Therefore, wild animals were not to be disturbed needlessly because they were equally sanctified as their domesticated counterparts. The Maasai adopted a philosophy of live and let live unless an animal became too much of a nuisance, in which case a ceremonial procession, '*olomayio*' was instituted to kill the offending beast(s). In addition, the

Maasai culture forbade them from feeding on game meat, unless one's life depended on it (Salaton, 2001).

Among pastoralists, the roles of men and women tend to be highly differentiated as they cope together with vicissitudes of their environment (Stackpool-Moore and Wheeler, 2005).

Community Based Institutions

A variety of community based institutions exist within pastoral communities. These include Group Ranch Committees, which are constituted to manage Group Ranches that are registered under the Land (Group Representatives) Act, Cap. 287. The Act provides for the election of members of these committees with the supervision of a representative from the Ministry of Lands.

Other CBOs include grazing committees, water management or irrigation committees, self-help groups and women's groups that are formed on a voluntary basis and that have varying numbers and composition of members. Due to the prevailing insecurity in some parts of the pastoralists areas, peace committees are formed to negotiate for more cordial relations between communities that have been hostile to each other. Some NGOs have facilitated the formation of project specific committees and also gender committees that address existing and emerging gender disparity issues within the respective pastoralist communities they work with.

Government Institutions

Starting with the colonial era, various central and local government institutions have been introduced that have an impact on the pastoralist production system.

Ministry of Livestock

The central government ministry in charge of livestock production has sometimes been combined with that in charge of agriculture and other times has been separated. Currently, it is the Ministry of livestock production and fisheries. This is the government ministry that provides extension services directly to pastoral communities, such as those of artificial insemination and vaccination, as well as providing livestock management and marketing infrastructure.

Ministry of Natural Resources

The ministry of natural resources comprises several agencies in charge of different natural resources, including forests, wildlife, geology and mines, soil conservation and the overall coordinating agency on the environment, the National Environment Management Authority (NEMA).

Kenya Wildlife Service

All wildlife is vested in the Kenya Wildlife Service (KWS), which directly manages all national parks and provides local authorities with technical assistance for the management of national reserves. Pastoral communities often interact with KWS, especially when they graze their livestock inside parks and/or when wildlife attack them or their livestock.

Local Government

Local government institutions that affect pastoralism include local authorities, such as county councils, municipal councils and town councils. Within Trust land, the land on which pastoral communities reside is vested in local authorities. While in most cases communities in Trust lands continue to regulate their lives using their traditions and customs, they are affected by local authorities in certain cases. Local authorities, in whom national reserves are vested control the movement of communities and their livestock in and out of these areas. This is especially significant during dry periods, because often, traditional dry season grazing and watering points are found within national reserves, such as in Amboseli, which was formerly a national park but has now been declared a national reserve under the jurisdiction of the Kajiado County Council.

Ministry of Lands

A key institution that has affected the pastoral production system is the Ministry of Lands. The changing policies and laws on land, and the manner in which they have been implemented has resulted in significant changes in land use in the pastoral areas. Further, the continued lack of an official land use policy has adversely affected the development of the pastoralist production system.

Historically, pastoral communities started losing large tracks of their land to make way for European settlers and later to agricultural communities, especially after the sub-division and sale of former group ranches.

The predominant land tenure policy and legal frameworks that operate in the pastoral areas are those on Trust land and Group Ranches.

The Trust Lands

Trust lands are found in the pastoralist districts of Turkana, Marsabit, Isiolo, Mandera, Garissa, Ijara and parts of Lamu District. This category of land was created after three commissions; the Ornsby-Gore Commission (1924-25), the Hilton Young Commission (1927-29) and the Carter Commission (1930-1934). As a result of these commissions, the Native Lands Trust Ordinance was enacted and later changed to the Trust Land Act, Cap 288 of 1939 (Wayumba, 2004). All Trust Land is vested in the respective county council for the benefit of the residents.

Some of the issues within Trust lands include the practice of county councils that act as if they own the land, as opposed to being trustees. Therefore, there is minimal sharing of the benefits of the resources within trust land between the councils and the local communities. In some districts, such as Narok and Transmara, there is substantial revenue generated by the Maasai Mara National Reserve, which is largely retained by the councils. In Turkana and Garissa districts the substantial revenue generated from the sale of firewood and gravel to the United Nations High Commission for Refugees (UNHCR) for use in the refugee camps of Kakuma and Dadaab, respectively, is largely retained by the councils. This issue is a source of conflict between UNHCR, the Councils and the local communities, who feel that the UN agency should give the community groups the contracts to supply the camps with these resources directly. In other cases, the Council alienate trust land, through the

adjudication process, for the benefit of a few individuals with no consultation with the larger community of residents.

The Group Ranch Model

The Group Ranch model of land tenure was introduced in Kenya as part of the African Land Development Board (ALDEV), that was established in 1946 to improve on the carrying capacity of the land, the productivity of cattle, and to control the ecological imbalance usually associated with such fragile ecosystems (Woodhouse et. al. 2000; Kidemi, 2001). Extensive pastoralism remained, in the eyes of the colonial administration, intrinsically harmful to the environment and a constraint on social and economic improvement. Therefore ALDEV focused on water development and rangeland management by reducing herd size within controlled grazing schemes. The concept of “group ranching” emerged in the 1950s but was not legislated until after independence in the 1963. The first group ranches in Kenya were established in Kajiado District in 1968 under the Kenya Livestock Development Project (KLDP), which was supported by World Bank loans for infrastructural development, particularly water supply (Woodhouse et. al., 2000).

Today, there are 401 incorporated group ranches covering an area of about 7 million hectares with a membership of 54,452 members. The ranches are in 13 districts of Narok, Kajiado, Samburu, Laikipia, Trans-Mara, Baringo, West Pokot, Taita Taveta, Kilifi, Kwale and Lamu. The group ranches were formed and incorporated only after the process of land adjudication and registration had been completed under the Land Adjudication Act (Cap. 284 of 1968) and the Registered Land Act (Cap. 300 of 1963). The land was then registered under the Land (Group Representatives) Act Cap 287 of 1968 (Wayumba, 2004).

A group in this context refers to a tribe, a clan, a family or any other group of persons whose land, is recognized under customary law to belong communally to more than five people who are members of that group. Each group selects about 10 of its members to be registered by the government as the trustees of the land. These trustees can allocate portions of the group ranch to members for a specific use and can also mortgage part of the land for monetary benefits on behalf of the group (Wayumba, 2004).

Some shortcomings of the Group Ranch Model include the fact that increasing pressure for land from agricultural communities and demand for individual titles has resulted in the sub-division of groups ranches, especially in Kajiado and Narok districts. There have been major changes in land tenure from communal to individual ownership, with subsequent problems of plot fencing, diminishing grazing areas and change from pastoralism to sedentary agriculture. This situation has precipitated a series of land use conflicts between pastoralism, agriculture and wildlife conservation (Wayumba 2004).

Special Government Programmes

Special government programmes, include those established to respond to specific emerging issues such as HIV/AIDS and drought. One such programme, the Kenya Arid Lands Resource Management Project is currently being implemented by the government with funding from the World Bank. The original objective of the project

was to “enhance food security and reduce livelihood vulnerability in drought prone and marginalized communities in 22 arid and semi-arid districts”, with the newly worded objective of “reduced livelihood vulnerability, enhanced food security, and improved access to basic services in 28 drought prone arid and semi-arid districts in Kenya”. The project has the three components of 1) Natural Resource and Drought Management, which aims at mitigating the risks posed by drought and other factors by strengthening and institutionalizing natural resource and drought management systems; 2) Community-Driven Development, which provides finances for the implementation of community-prioritized investment projects, community capacity building and capacity building for backstopping services in arid districts; and 3) Support to Local Development, which aims to improve the delivery of essential services in arid districts and promotes the interests of arid lands at the national level. (World Bank, 2006).

6. MANAGING FOR RISK AND ENHANCING RESILIENCE

Traditionally, the rangelands of eastern Africa supported a pastoral subsistence economy based on milk production, although other products, such as meat, blood, hides and skins, and services, such as traction and transport, were also used. Livestock played a very important role in pastoral culture and religion, they were both social capital and an insurance against disaster. Pastoralists had evolved a number of strategies aimed at providing a continuous supply of food and the avoidance or minimizing of risks to both people and livestock. These strategies included;

Mobility: Pastoralists move about over the rangelands in order to obtain sufficient supplies of forage and water, to avoid disease outbreaks or because of social and political instability. For example, the Turkana in arid northwestern Kenya move for distances of 20-50 kms, 5-10 times a year (Herlocker, 1999).

Livestock Diversity: Maintaining a flexible mixture of stock species with different feeding, ranging, production, disease and drought resistance and reproductive characteristics maximizes yields and provides greater long term security for herders by using all niches/resources. For example, by combining sheep and goats, which have complementary feeding habits (grazing/browsing), results in a higher rangeland carrying capacity than when flocks of only a single species are used (Herlocker, 1999). Traditionally, among the Rendille and Ariaal pastoralists of Marsabit, livestock were divided according to species and productivity. Dry livestock including sheep, goats, cattle and male camel castrates formed the *forra* herd and they were highly mobile. *Forra* were under the responsibility of *morans* (warrior group). Lactating animals and their young are called *marro* and are left in the main camp (*gob*) for supply of milk and are under the responsibility of married women, elders and children. Animals were transferred between the two systems as their status changed (Haro, 2006).

Milk-Based Diet: The human carrying capacity of the land is maximized by emphasizing milk, rather than meat, in the diet. Although milk has a lower caloric value than meat, more of it is got over time and is easier to use quantities than meat and therefore supporting more people per animal. Therefore, emphasis is placed on producing ample, or at least maximal supplies of milk (Herlocker, 1999).

Dry-Season Grazing Areas: Use of high potential grazing areas, such as swamps, highlands and riverine area, during dry seasons and droughts. Because such areas are relatively small in area compared to wet season pastures, they provide forage and water until the coming of the rains allow livestock to move back onto the wet season ranges (Herlocker, 1999). Traditional grazing resources among the Rendille and Ariaal pastoralists of Marsabit were divided into wet season areas, dry season areas and drought pasture reserves, while grazing pressure was regulated by having certain closed areas, referred to as *lokeere* (Haro, 2006)

Maximizing Stock numbers: A purely subsistence pastoral existence required large numbers of livestock. The accumulation of stock is done in the hope of keeping enough animals to ensure long term survival of herds despite losses incurred during periodic droughts and disease outbreaks. In addition, there is increased social standing for the owner. Another reason for stock accumulation is that many pastoralists lack alternative means of investment (Herlocker, 1999).

Splitting herds: Splitting stock holdings into different herding units, depending on species, maturity and reproductive condition, and pasturing them in different areas ensures that animals are herded in optimal habitats and spreads the risk of loss through drought, disease and raiding (Herlocker, 1999).

Preference for females over males: This ensures optimal supplies of milk and calves and gives the herder a better chance of quickly building up his herd again in the aftermath of disaster. For Maasai cattle herds females comprise 65-70%, while Somali camel and smallstock herds females comprise 83% and 91%, respectively (Herlocker, 1999).

A social security system of stock loans and redistribution: Maintaining a social security system of stock loans and redistribution among friends and kinsmen that spread risk over a wider geographical area and range of habitats. Stock given out provides the basis for the giver to ask for stock in return from the recipient, should he fall on hard times (Herlocker, 1999).

Disease Control

In most of sub-Saharan Africa, the public sector has been the major or exclusive provider of animal health services. Delivery of animal health services in pastoralist areas, either by public or private sector, presents major problems. In the pastoral areas, for example, the chronic transport problems experienced by government veterinary officers, the long distances involved, the rough terrain and inadequate infrastructure lead to poor delivery of services (ITDG, 2000).

Due to unavailability of conventional drugs and the high costs involved, many pastoralist communities therefore tend to rely on traditional herbal cures to manage their livestock diseases. These communities are sometimes affected by outbreaks of diseases, such as rinderpest, East Coast Fever and Sleeping Sickness (Nagana), resulting in great losses. Of the diseases shared by livestock and wildlife, rinderpest causes the greatest mortality. The disease can be controlled by cattle vaccination (Herlocker, 1999).

According to a report entitled “Kenya Environment and Livestock Industries”², although there is adequate data on the economic losses due to ticks and tick-borne diseases, the information is usually held in scientific reports and is often unavailable to policy makers and farmers. There is also over-reliance on donor funding for tick control and the donors do not always use the locally available knowledge. Therefore, the control of tick and tick-borne diseases is not based on the latest scientific knowledge. Current tick control measures are based on the control of East Coast Fever, which involves intensive weekly dipping all year round. It is evident that there are areas in Kenya that need not follow this regimen when one takes into account current knowledge on tick biology and the epidemiology of the distribution of East Coast Fever and other tick-borne diseases. Areas that do not require weekly dipping include those where the vector of ECF is absent, those where the vector is present and cattle have endemic stability to tick-borne diseases, and those where ECF is being controlled by other means, e.g. immunization. 1995 estimates show that it costs approximately Ksh. 34 and Ksh. 18 to spray or dip an animal, respectively. Additional problems include environmental pollution by the numerous acaricides used, and the development of resistance to acaricides by several tick species.

The fact that many pastoralists have continued to rely on their indigenous knowledge of flora and fauna with medicinal properties to treat their livestock has ensured that this knowledge has not been lost. This knowledge is being increasingly recognized by government and NGO programmes, which are increasingly working to document and preserve this knowledge, such as the Indigenous Vegetation Project that is being implemented by the Ministry of Natural Resources with funding from the Global Environment Facility, through UNDP and UNEP (IVP, 2006).

Early Warning Systems

Droughts and floods are the major disasters affecting Kenya. In the last 100 years, Kenya has recorded 28 major droughts, three of them in the last decade. The severity and frequency of droughts seem to increase in the country over time (Murungaru, 2003).

Between 1993 and 2003, Kenya declared four national disasters; in 1992/93, 1996/97, 1999/2001 due to droughts and the 1997/98 *El Nino* related floods. During the 1999-2001 drought, Kenya government spent an estimated US Dollars 300 million to provide assistance to more than 4.2 million affected people. Kenya gained considerably by using an early warning system during this particular drought. Under this system, the communities collect data which is channeled to the district steering group for discussion and forwarding with recommendations to the national level Kenya Food Security Meeting (KFSM). The KFSM is composed of government ministries, donors and NGOs and chaired by the Office of the President and the World Food Programme representatives. If the drought is severe and beyond the KFSM resource capability, KFSM forwards its recommendations to the national food security committee, which is chaired by the minister of State in charge of the provincial administration and the national security. (Murungaru, 2003).

² <http://www.ento.csiro.au/research/pestmgmt/ticks/kenya.htm#kenya#kenya> retrieved June 30th 2006.

The World Agroforestry Centre (formerly ICRAF; the International Centre for Research in Agroforestry) is using infrared spectroscopy technology to detect changes in soils that could indicate nutrient depletion (Sagwe, 2006).

Due to the relatively high costs, both in terms of human and financial resources, required to develop and implement effective early warning systems, it is important for a diversity of stakeholders to collaborate to ensure that the relevant data and information is collected on a regular basis and also acted upon. The role of government is key, as it can act as a major mobiliser for participation in the implementation of such systems.

The role of communities in early warning systems includes as key stakeholders in data collection and also in providing solutions for coping with droughts. Throughout history, communities living in drought prone areas have developed mechanisms of coping with droughts. Planting and storing drought tolerant food crops was a key coping strategy. With the advent of cash crops, high-yielding crop varieties and changes in dietary habits, the traditional drought tolerant crops have increasingly been ignored. Even in dry areas where crops such as sorghum, millet and cassava used to be grown for subsistence, habits have changed in favour of crops such as maize and bean, especially new varieties, regardless of the risk of repeated crop failures. (UNEP and GoK, 2000). For example, the Turkana have over 20 different varieties of sorghum, a crop that is drought tolerant (Barrow, 2006).

Another adaptive mechanism to reduce risks among the Kalenjin, Maasai and Turkana tribes was the exchange of livestock through loans and through bride wealth. Each family herd was widely dispersed among many friends and relatives living in distant parts of the country. Pastoralists reduced the risk of animal losses through droughts, raids and diseases in this way. By loaning their stock pastoralists widened their number of friends and relatives whose assistance could be relied on in times of need. This strategy benefited both the individual and society as a whole (Mutiso, 1995).

7. COMPATIBILITY WITH OTHER FORMS OF LAND USE

Within the dry lands of Kenya, the main competing land use systems are pastoralism, wildlife conservation and agriculture. Other land use systems that compete with these three in specific localities include quarrying, especially of building stones, sand, marrum and red soil and mining of gemstones, which are mainly found in the dry lands, such as in Taita Taveta, Turkana and Isiolo.

The declining size of farm holdings in the agricultural areas, coupled with declining soil fertility has meant that there is a constant demand for more land to farm. Increasingly, the land that is being converted to agriculture is pastoralist land, usually starting with those areas around permanent water sources, such as along rivers and springs. Medium potential areas, which can support rain-fed agriculture are also prone to conversion from pastoralist use to agriculture. Large areas of Narok district have been lost to both pastoralists and wildlife as they have been leased to commercial wheat farmers.

As observed by Aveling et. al. (n.d.) pastoralism and wildlife conservation can co-exist, however, it is extremely difficult for large scale or intensive agriculture to co-exist with either pastoralism or wildlife conservation. The form of agriculture that seems to be compatible with pastoralism and wildlife conservation is subsistence agriculture or capital intensive agriculture as practiced in commercial ranches, that include zoning of the ranch and the separation of the different forms of land uses through fencing.

8. THE ENABLING POLICY FOR PASTORALISM

Although population increase is a factor that has contributed to the destruction of rangeland habitat, according to Herlocker (1999), this destruction has been occurring at a faster rate than can be explained by population changes. Some of the other factors include government policies that have often favored agriculture over pastoralism. These policies have resulted in pastoralists losing their dry season grazing lands to crop cultivation. This bias continues to the present, and includes poor production and marketing infrastructure, that tends to favor middlemen over the pastoral communities.

Historically, land tenure changes that included the establishment of settlement and irrigation schemes, state farms, national parks and game and forest reserves often removed valuable dry season grazing areas from use by pastoralists. This has resulted in the concentration of growing populations of pastoralists and livestock on smaller areas of less productive rangeland, leading to increased competition for, and over-exploitation of rangeland resources. For example, the Shaba National Reserve that was established in 1948 and gazetted in 1974 has 17 springs of water which are now inaccessible to the local pastoralists (KWS, 2006).

Disregard of existing systems of range management among pastoralists groups by government officials has resulted in traditional knowledge being ignored and undermined by official government policies. The diverse tenure systems that existed, including for trees, springs, water pans, salt licks and dry and wet season grazing areas have been destroyed through the increased privatization of land and the gazettement of different categories of government land. The impacts of these new tenure systems have been the greater degradation of the rangelands and the lack of responsibility for their maintenance.

Historically, some government policies and programmes have acted as perverse incentives, in that they have undermined the pastoral production system, either intentionally or unintentionally. For example, the fact that prices of livestock plummet during drought periods acts as a disincentive for pastoralists to sell, which in turn results in them incurring greater losses, and having more destructive impacts on the fragile dry lands.

Some of the government's marketing policies have also discouraged pastoralists from collaborating with the government. For example, in the 1950s, the colonial government created a marketing body, the African Livestock Marketing Organization (ALMO) which bought livestock from the Samburu. The Samburu were given a quota of livestock which they had to periodically produce for sale; ALMO had a marketing monopoly. ALMO preferred to buy immature stock which would then be fattened on

private ranches and resold. Selling immature stock is disadvantageous for pastoralists as the relatively low production costs reduce the risk of keeping the animal to maturity, when it will fetch a higher price. The Government's policy of buying immatures, which continued after independence, was therefore never popular among the Samburu.

After independence, the ALMO was replaced by the Livestock Marketing Division (LMD) which continued the policy of buying immature livestock. Livestock were bought by weight and payments were deferred pending successful sale and slaughter in Nairobi. These new policies, plus the continuation of the policy of purchasing immatures made the LMD become less and less popular. Subsequent competition with private traders and butchers incurred large losses which eventually led to the closure of the LMD in the 1980s Herlocker (1999).

According to Herlocker (1999), the western ranch model (the main contribution of western "science" to range development) has failed within the region, leading some of the major donors, such as USAID, to stop funding development of dry land regions almost completely.

Insecurity, especially in the form of cattle raiding, coupled with the proliferation of small arms in the northern part of Kenya is another factor that has affected the rangelands. Insecurity tends to result in pastoralists seeking refuge in or around major urban centers. The over concentration of people and livestock within smaller areas results in rangeland degradation and reduced biodiversity.

If well articulated and supported by relevant data and information, customary laws that were used for the management of natural resources can be recognized by governments and incorporated into official policy. For example, the recognition of the traditional institutions and systems for the management of the *Kaya* sacred forests is an example of how the government can be lobbied to be more inclusive of such systems. Similarly, traditional dispute resolution councils of elders are being recognized for their role in ameliorating relations between warring ethnic groups.

Since the NARC (National Rainbow Coalition) government came into power, there have been significant policy and institutional changes that have had or have the potential to benefit the pastoralist production system and improve the livelihoods of pastoralists. Key among these is the re-vamping of the Kenya Cooperative Creameries and reverting its ownership to milk producers. The re-opening of the Kenya Meat Commission (KMC) is being hailed as an opportunity for livestock producers to accrue more tangible economic benefits through the sale of their animals, locally, regionally and internationally. There has been increased response from the government and the people of Kenya to the recurring droughts in the dry lands, with many institutions setting up emergency response units and also showing an interest in contributing to long term solutions to drought in the country.

The devolved Constituency Development Fund (CDF) provides an opportunity for communities, including those in the dry lands, to access funding for projects to improve their livelihoods. In addition, the World Bank funded, government implemented Arid and Semi-arid Lands Programme (ASAL Programme) provides

community groups with funds of up to Ksh. 1 million for communal projects in specific dry land districts. Similarly, the Local Authority Transfer Fund (LATF), which is administered by the respective local authorities, is meant to be for community projects. However, in some cases, limited knowledge by communities in these regions of these opportunities results in the funds being under-utilized.

The government has attempted to develop legislation aimed at protecting traditional people's rights and to regulate access to genetic resources. In 1999, in response to the requirements of the Convention on Biological Diversity (CBD), the National Council of Science and Technology set up a committee on genetic resources to develop national guidelines for regulating access to genetic resources and overseeing their implementation and enforcement (Mukiama, n.d.). The Environmental Management and Coordination Act (EMCA) provides for the regulation of access to genetic resources, but the mechanisms for ensuring that benefits go to traditional communities are absent.

International bio-prospecting and bio-piracy are realities that Kenya is not prepared for. This means that the country and its people are vulnerable to exploitation by large multi-national pharmaceutical companies. Below is an example of an on-going controversy over the piracy of genetic resources from the dry lands of Kenya.

Box I: Industrial Enzymes from Microbes -- *Out of Kenya*

Teenagers, pop stars, and other wearers of blue jeans have more trendy looking clothes, thanks to unique fading enzymes from a microbe collected in Lake Nakuru in Kenya. Not only that, but the clothes are probably cleaner, thanks to another Kenyan microbe whose enzymes are used in Procter & Gamble's global detergent brands.

Both microbes, and the key enzymes they produce, are owned by California-based Genencor, a biotech company purchased in 2005 by Danisco of Denmark, a 10,000 employee food and life sciences company with about US \$3.4 billion in annual revenues. What's the problem? The Kenyan government, for one, says that the collections – made in 1992 by a British researcher and later patented by Genencor – were not approved and, further, that the country is not receiving benefits from the commercialization of the enzymes. In September 2004, Kenya filed suit against the company in US courts.

Source: McGown, 2006.

The Economic Recovery Strategy for Wealth and Employment Creation: 2003-2007 devotes a section to the Arid and Semi-arid Lands (GoK, 2003). In this section, strategies for the improved production and marketing of livestock, as well as livestock production, are laid out as follows;

Box II: Government Strategies for Livestock and Tourism Development

Livestock Development

To improve animal production and marketing, the government will make specific interventions that include;

- Providing adequate water for the rangelands by sinking boreholes and constructing dams at strategic locations in the region to avoid disruption of the migratory nature of the communities;
- Conducting research on livestock breeds, and particularly on the indigenous livestock, with a view to improving the local breeds;
- Putting in place measures to control environmental degradation and carrying out periodic national livestock census;
- Strengthening the animal health delivery system in the region by providing mobile animal health clinics and screening units and disease surveillance mechanisms;
- Addressing legal and policy barriers to livestock trade, such as livestock movement quarantines and cess/taxation;
- Developing supporting infrastructure, including roads, and stock routes with water facilities;
- Strengthening disease control measures in partnership with regional animal health programmes;
- Creating strategic Disease Free Zones to facilitate export of live animals;
- Increasing cross-border disease surveillance and cross border conflict resolution and management mechanisms.

Tourism Development

- Allocate a larger portion of the revenue generated from game reserves and national parks to community projects;
- Strengthen community based wildlife conservation and other approaches through which wildlife can benefit pastoralists directly so as to motivate them to conserve and accommodate wildlife in their production systems;
- Support development of eco-tourism activities since the areas have very high potential for eco-tourism.

Source: GoK (2003).

9. CONCLUSION

For pastoralism to continue being an effective management tool for conservation while contributing to livelihood security, it is important that policy makers and implementers acknowledge the significant changes that have occurred in the land tenure and land use systems, the lifestyles of the pastoral communities themselves, the changes in the livestock kept, and the changes in the values placed on livestock and the other resources of the dry lands. Innovation and adaptability need to be woven into the current pastoral production systems to ensure they are able to withstand pressures from the external environment, while taking advantage of new opportunities.

Some of the existing opportunities for promoting pastoralism as a conservation strategy that also contributes to livelihood security include the customary institutions and knowledge systems that had many positive strategies for managing natural resources during times of plenty and also during stress periods, such as droughts and floods. Such systems include the demarcation of dry and wet season grazing areas, species and age-group diversity of herds and the planting and storing of food to meet household needs during lean times. The existing knowledge among pastoralist groups about the many plants found in the ASALs and their diverse uses, such as for food, fuel and fodder, should be made better use of. Instead of some of the current trends of promoting exotic species of plants, indigenous multiple use plants should be promoted, through enhanced research on their propagation and management. Research institutions should collaborate with pastoral communities in developing methods for promoting indigenous plant species.

Since pastoralism operates within a broader landscape that includes agricultural production, as agricultural production expands into the pastoral areas, the resources available for the pastoralists diminish. Therefore, it is important for pastoralists and their supporters to engage in lobbying and advocacy campaigns aimed at raising the awareness of policy makers that pastoralism is an economically viable system that is currently making a significant contribution to the national economy. A tendency to treat pastoralism as an isolated production system, that does not interact with other production systems, such as agriculture and tourism, has resulted in pastoralism being considered an inferior option to the other two. By demonstrating that pastoralism has been instrumental in ensuring that the vast range lands continue to host a wealth of wild animals and plants, which are critical for the tourism industry, a case can be made for supporting pastoral communities.

In addition, it is important to recognize that the pastoralist system itself has changed and become more market oriented. Therefore, it is important to support both subsistence and commercial modes of pastoralism, through incentives and regulations that encourage wise-use of natural resources, while discouraging over-exploitation. Land tenure and land use policies, which continue to lag behind the economic development of the country need to be addressed as a matter of urgency. Such policies should address issues such as absentee landlords, minimum land holdings for the for the different agro-ecological zones of the country, security of tenure, especially for communities living on Trust land and incentives for the private sector to invest in the pastoralist areas.

Lobbying and advocacy campaigns should be designed, using well articulated examples and models for different circumstances, environments and local realities. Therefore, “best and worst” practice case studies should be included in advocacy campaigns to policy makers, as they serve to illustrate options that can be incorporated into the policy and legal frameworks.

REFERENCES

- Aveling, R., E. Barron, P. Bergin and M. Infield (n.d.) *Livestock and Wildlife in the Environment: Diversity in Pastoral Ecosystems of East Africa*. African Wildlife Foundation, Nairobi, Kenya.
- Barrow, E. (1996) *The Drylands of Africa: Local Participation in Tree Management*. Initiatives Publishers, Nairobi, Kenya.
- Barrow, E. (2006) pers. comm.
- CIA (2006) <http://www.cia.gov/cia/publications/factbook/geos/ke.html> retrieved on June 30th 2006.
- Curry, P. (2000) *Commercial Gums and Resins Botanical Source and Quality in Wajir and Mandera*. Final Report of the Gum and Resin Research Project Phase II: September 1998- January 2000. Voluntary Services Overseas (VSO) and Saltlick, Isiolo, Kenya.
- Doyo G. (2003) *Land Tenure and Needs for Reform in Pastoral Areas of Kenya* an East African Case Study presented at PAPPLR Workshop in Cairo of 25th – 26th March 2003.
- ELCI (2002) *Hot and Dirty: Inside Kenya's 23 Billion Shilling Charcoal Industry*. In Ecoforum, Vol. 25. No. 4. Long Rains 2002, Environment Liaison Centre International.
- ELCI (2005) *Community Guide to Environmental Issues: and to the Environmental Management and Co-ordination Act, 1999: Arid and Semi-Arid Lands*. Environment Liaison Centre International, Nairobi, Kenya.
- Government of Kenya (2003) *Economic Recovery Strategy for Wealth and Employment Creation: 2003 – 2007*. Nairobi, Kenya.
- Haro, G. O. (2006) *The Role of Indigenous Knowledge in Range Management in South West Marsabit: Overview of Trends and Current Situation*. a brief prepared for CBNRM Stakeholders Workshop, Nakuru, February 28th – March 2nd 2006 by the Indigenous Vegetation Project (IVP).
- Heong C. Y., (2006) *Thirty-Six Cases Show Growing Bio-Piracy in Africa*. Third World Network.
- Herlocker, H. (1999) *Rangeland Resource in Eastern Africa: Their Ecology and Development*. German Technical Cooperation, Nairobi.
- ITDG (2000) *Community-Based Animal Health Care in East Africa: Experience and Case Studies with Particular Reference to Kenya*, Intermediate Technology Development Group.

- IVP (2006) *Draft Report on the Indigenous Knowledge of Turkana Community*. Indigenous Vegetation Project, Ministry of Environment, Natural Resources and Wildlife, Global Environment Facility, UNDP/UNEP, Kenya.
- Karanja F., Y. Tessema and E. Barrow (2002) *Equity in the Loita/Purko Naimina Enkiyio Forest in Kenya: Securing Maasai Rights to and Responsibility for the Forest*. IUCN-Eastern Africa Regional Office, Nairobi, Kenya.
- Kenya Forests Working Group (2006) *Sandalwood Threat: Surveillance Bears Fruit but Threat Undiminished*. in Misitu News, Issue No. 8, May 2006.
- Kenya Wildlife Service (2006) *Shaba National Reserve*.
- Kigomo N. B. (2001) *State of Forest Genetic Resources in Kenya*. Report presented at the Sub-Regional Workshop of FAO/IPGRI/ICRAF on the conservation, management, sustainable utilization and enhancement of forest genetic resources in Sahelian and North-Sudanian Africa in Ouagadougou, Burkina Faso in 22 – 24 September 1998. Forest Genetic Resources Working Papers, Working Paper FGR/18E. Forestry Department, FAO, Rome, Italy.
- Macharia, P. (2004) *Kenya*. a report of the Kenya Soil Survey, Nairobi, Kenya.
- Maliti, T. (2003) *A Storm in Dadaab*. in Ecoforum, Vol. 26. No. 1, Hot Season 2003.
- Marshall, N.T. (1998) *Searching for a Cure: Conservation of Medicinal Wildlife Resources in East and Southern Africa*. TRAFFIC International.
- McGown, J. (2006) *Out of Africa: Mysteries of Access and Benefit Sharing*, Edmonds Institute, in cooperation with African Centre for Biosafety.
- Ministry of Lands and Housing (2005) *National Land Policy: The Formulation Process: Issues and Recommendations Report*. National Land Policy Secretariat, Ardhi House, Nairobi, Kenya.
- Mukiama, T.K. (n.d.) *Some Important Medicinal Plants of Kenya: Policy Issues and Needs for Commercial Development*. Department of Botany, University of Nairobi.
- Munyao K. (2006) Contribution to the UNDP Dry lands E-Forum held in April - May 2006.
- Murungaru C. (2003) *Statement by the Minister of State, Office of the President, Republic of Kenya during the official opening of the Second International Conference on Early Warning (EWC-II)*, Nairobi, Kenya.
- Mutiso, S.K. (1995) *Adaptive Strategies for Sustainable Livelihoods: A Review and Analysis of Development Policy for the Arid and Semi-Arid Areas of Kenya*.
- Ouma, M. (2006) *Kenya: Meat Industry to Seek Regional Supplies*. In the East African Business Week, Kampala, Uganda. Posted on the web June 5th 2006.

Sagwe, G. (2006) *Combating Desertification through Science* in Ecoforum, Vol. 27 No. 3. The Environment Liaison Centre International (ELCI), Nairobi, Kenya.

Salaton, T. R. (2001) *The Effect of Change in Landuse on Human/Wildlife Interaction in Kirindon and Lolgorian Divisions of Transmara District*. a thesis submitted in partial fulfillment of the Requirement of Master of Philosophy Degree in the School of Environmental Studies, Moi University, Eldoret, Kenya.

Stackpool-Moore L. and J. Wheeler (2005) *Ways of Listening to Gender in Rain, Prosperity and Peace: A Report from the Global Pastoralist Gathering held in Turni, Ethiopia*.

UNEP and GoK (2000) *Devastating Drought in Kenya: Environmental Impacts and Responses*. Nairobi, Kenya.

USDA, Foreign Agricultural Services, (2006) <http://www.fas.usda.gov/pecad-highlights-2004-12-Kenya-images-kenya/production/systems/gif/files> retrieved on June 30th 2006.

Wayumba, G. (2004) *A Review of Special Land Tenure Issues in Kenya*. Department of Surveying, University of Nairobi.

Were G. S. and D. A. Wilson (1968) *East Africa through a Thousand Years: AD 1000 to the Present Day*. Evans Brothers Limited, Nairobi, Kenya.

Woodhouse, P., H. Bernstein and D. Hulme (2000) *African Enclosures? The Social Dynamics of Wetlands in Drylands*. James Currey Ltd., Oxford, U.K.

World Bank (2006) *Project Information Document (PID): Kenya Arid Lands Resources Management Project Emergency Additional Financing*.

Annex: Terms of Reference

The Goal of WISP

The overall goal of the WISP project is;

To enhance the enabling environment for sustainable rangeland management, improved pastoral livelihoods, and pastoral empowerment.

Purpose of WISP

The purpose of the WISP project is;

To advocate and engage in capacity building in support of pastoral sustainable land management, through a catalytic partnership between pastoralists, donors, UN agencies, NGOs and the private sector.

The Overall Purpose of WISP

The overall purpose of this project is;

To demonstrate the importance of conservation and natural resource management as an asset for sustainable pastoralism in the eastern African region.

Objectives:

The following objectives are envisioned:

1. Importance of conservation and natural resource management to pastoralism at national and regional levels better understood in the Eastern African Region;
2. Understanding why pastoralism is important for conservation;
3. Wider awareness created on the importance of conservation to pastoralism at national and regional levels created, especially amongst national NGOs, and Government;
4. Policy processes informed in the region through the use of the policy briefs by the WISP project; and
5. Lessons and results from this project shared with the IUCN Western Africa Office and its members and partners.

This project will work from the ecosystem approach, with a specific focus on pastoralist and dry land use systems. How pastoralists use, manage and conserve biodiversity and natural resources is a key focal area. The project will seek to demonstrate the importance of pastoralism as a conservation strategy for the dry lands of Eastern Africa. The policy briefs and other materials from this project will be used by WISP in their process of advocacy and policy influence at the national government levels, as well as with regional intergovernmental agencies, and with various global processes, for instance the UNCCD, CBD and CSD.

Through WISP the findings of this project will find a strong place in policy influence and advocacy through the variety of workshops and meetings which WISP will organize (or co-organize with others). All the material, especially the policy briefs

will be hosted on the, to be established, WISP web site so that the knowledge and information will be available globally. In addition the national consultants will work with various NGO's and other groups to gather the necessary data on pastoralism. WISP and IUCN will ensure that the different pastoralist institutions get copies of the products from this study, and in particular the policy briefs which will be produced.

The Study

This series of studies seeks to analyse and synthesise past work on pastoralism and the importance of natural resources to pastoralists in Eastern Africa, considering pastoralism as a form of conservation. The study is being carried out through literature review, as well as trying to collect, electronically if possible, important publications, by a team of national consultants (one from each country) coordinated through the IUCN Eastern African Regional Office. The policy briefs and the more substantive reports will also be an important contribution to the UNDP-GEF supported World Initiative on Sustainable Pastoralism (WISP) which IUCN will implement, through its Eastern Africa Regional Office where advocacy is one key objective.

Detailed Terms of Reference for the Country Study

The national consultant will:

1. Analyze and review existing published and “grey” literature with respect to pastoralism in Kenya as a natural resource management strategy, and paying attention to the following main areas;
 - Pastoralists natural resource and land management strategies, and how they are conservation supportive;
 - Pastoralists institutions and knowledge systems about environmental and natural resource management;
 - Pastoralists more detailed knowledge about particular species (especially of plants and trees, but also of animals) relating to natural resources and biodiversity; and
 - How pastoralist risk mitigation and resilience enhancement strategies support the sustainable use of such lands over space and time.
2. Assess the extent to which pastoralism as a conservation strategy is or can be compatible with other forms of land use (for example conservation areas, agriculture);
3. Gather detailed information on the important stakeholder groups, and assess how important such groups are in decision making concerning pastoralism at a national level;
4. Assess the disincentives and perverse policies which impact on pastoralism as a conservation strategy at local and national levels; and
5. As appropriate collect as many publications and documents (preferably in electronic format) as part of the study.

Expected Output

The consultant will be expected to produce;

1. A detailed country report on Pastoralism as a Conservation Strategy following the indicative layout, as suggested in Annex 1; and
2. Collection of relevant literature (preferably in electronic form), which will be made available to IUCN for possible wider use in the global WISP project – this would also include contact details of authors and report owners.