Annex 1: Mapping Report

Economics of Land Degradation:

Review of Land Degradation and Sustainable Land Management Issues in Kenya

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ACRONYMS

ACC	Africa Conservation Centre
ACTS	Africa Centre for Technology Studies
ASAL	Arid and Semi-arid Land
CBD	Convention on Biological Diversity
CBO	Community Based Organisation
CDTF	Community Development Trust Fund
CGIAR	Consultative Group on International Agricultural Research
CIAT	International Centre for Tropical Agriculture
DANIDA	Danish International Development Agency
EIA	Environment Impact Assessment
ELD	Economics of Land Degradation
EMCA	Environment Management Coordination Act
ESDA	Energy for Sustainable Development Africa
FAO	Food and Agriculture Organization
GDP	Gross Domestic Product
GIS	Geographic Information System
GOK	Government of Kenya
ICIPE	International Centre of Insect Physiology and Ecology
ICRAF	World Agroforestry Centre
IDRC	International Development Research Centre
IGAD	Intergovernmental Authority on Development
INRM	Integrated Natural Resource Management
ILRI	International Livestock Research Institute
IUCN	International Union for Conservation of Nature
JICA	Japan International Cooperation Agency
KARI	Kenya Agricultural Research Institute

KBS	Kenya Bureau of Statistics
KIPPRA	Kenya Institute for Public Policy Research and Analysis
MEA	Multilateral Environment Agreement
NAP	National Action Plan
NEMA	National Environment Management Authority
NEPAD	New Partnership for Africa's Development
SIDA	Swedish International Development Agency
UNCCD	United Nations Convention to Combat Desertification
UNDP	United Nations Development Programme
UNEP	United Nations Environmental Programme
UNFCCC	United Nation Framework Convention on Climate Change
USAID	United States Agency for International Development
WRI	World Resources Institute

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1. Background and Context

1.1 Land and Natural Resources - Kenya Economy Nexus

The definition of land in the new Kenya Constitution includes the physical area and natural resources above and below the land. For the purpose of this paper and in line with the Kenya Constitution 2010, land is the physical space and natural resources on it. Land is the most strategic resource for Kenya and provides the natural capital of goods and services that form the backbone of the country's national subsistence economies. This natural capital often determines the nation's wealth, political influence and status in the global economic system.
Demands on land for subsistence and for economic development together with pressures from the increasing population are leading to unprecedented and often unsustainable land use changes, causing land degradation in most landscapes. The result is loss of land productivity with impacts on livelihoods and the economy. Human activities are aggravated by natural disturbances such as droughts or floods. Resultant land degradation manifests itself in many forms; among them are soil erosion, silting of water bodies, loss of soil fertility, reduced vegetation cover, and the reduced overall ecological carrying capacity of landscapes. These landscapes are also inhabited by communities who often have different cultures, values and lifestyles. Consequently, the diverse socio-economic and ecological environments require an equally diverse array of approaches to use the land sustainably and to reverse and mitigate the effects of already degraded landscapes. Similarly the challenges and issues related to managing and integrating land and natural resources to meet subsistence and economic demands are many, equally diverse and complex.

Continued existence of the natural systems and ecosystem services will depend on how sustainably they are protected and harvested. However, if the resources are consumed at a rate that exceeds their natural rate of replacement, the standing stock will diminish and eventually run out. Consequently the rate of sustainable use is determined by the replacement rate and amount of standing stock of that particular resource. Wise use and management of natural resources is therefore a prerequisite for building and sustaining Kenya's wealth.

Among the objectives on the Draft National Environment Policy (2012) are to ensure sustainable management of the environment and natural resources for economic growth and improved peoples' livelihood and wellbeing and to promote and support the use of innovative environmental management tools such as incentives, disincentives, total economic valuation, environment impact assessment, environmental audit and payment of environmental services in environment and natural resources management. In addition, the guiding principles for implementation of the policy include good governance, sustainable use, total economic valuation, equity and polluter pays principles. These objectives are in tandem with Economics of Land Degradation (ELD) Initiative.

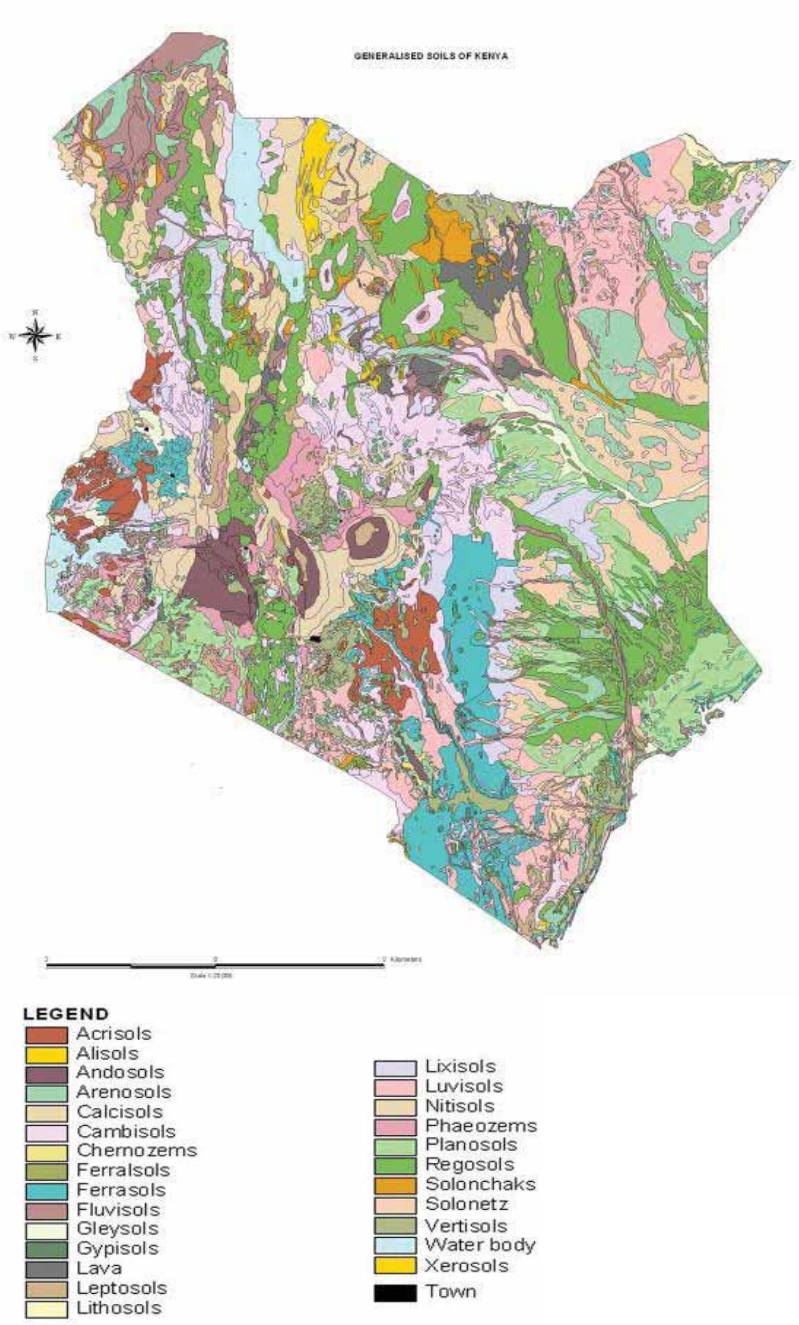
Ecosystems provide a wide range of goods and services that form the backbone of Kenya's economy. Within the ecosystems are key natural resources which provide natural capital for economic growth and development and which also support subsistent livelihoods. Below is an overview of the resources and their contribution to Kenya's economy.

1. 1.1.1 Soils

Soils are dynamic and diverse natural systems that provide critical ecosystem services such as a living filter for water, a sink for carbon, a regulator of atmospheric gases, and a medium for plant growth. Soil is therefore one of Kenya's most valuable and most widespread natural resources, supporting agriculture, forests, woodlands, natural grasslands and pastures - the building blocks of national economy and livelihoods. Kenya has 25 major soil groups based on soil properties which are a result of interaction between climate, topography, parent material, organisms and time (Sombroek et al. 1982, FAO 2006). The country's soils are continuously being subjected to widespread erosion largely because of the lack of vegetation or forest cover, overgrazing and cultivation, especially in the arid and semiarid regions. There is also a general decline in land productivity because of loss of top soil and declining soil fertility. The rate of soil erosion and degradation depends on the way the land is being used, the texture and nature of the soil, topography and climatic conditions. Sustainable land use practices must minimize degradation of soil and instead permit long-term production in an ecologically and economically viable way.

The inherent infertility of arid and semi-arid land (ASAL) soils and soil erosion are major production constraints. The combination of overgrazing and raindrop impact causes soil compaction, leading to low infiltration rates and high runoff, waterlogging and flooding. Reduced soil biota and biological functions due to soil degradation are related to loss of soil organic matter (the substrate for soil life) and breakdown of the complex soil food web. On crop lands, continuous cropping by resource poor families has caused further nutrient mining and decline in soil fertility. This is exacerbated by inadequate use of technology and/or application of integrated crop-livestock and agro-forestry farming systems. The result is a downward spiral of degradation, with poor soils and vegetation cover impacting on agricultural productivity, ecosystem resilience, the hydrological regime and food security. Figure 1 below shows the major soil types in Kenya.

Figure 1: Major Soils in Kenya



Source: Muchena, F. N. et al. (1982). An outline of the major soils in Kenya, Exploratory Report No. E2, Kenya Soil Survey, National Agricultural Laboratories, Ministry of Agriculture, Nairobi, Kenya.

1.1.2. Agriculture

The agricultural sector is made up of four major sub-sectors, namely, industrial crops, food crops, horticulture, and livestock and fisheries. Crops contribute 86%, livestock 12% and fisheries 2% of the sector. Agriculture has been identified as a key sector that will drive the economy to attain 10% of the Gross Domestic Product (GDP) and sustain it for the next 25 years (GOK, Kenya Vision 2030, 2007).

According to the Kenya Bureau of Statistics, agriculture remains the backbone of the national economy, contributing 26% of GDP and supporting over 80% of the population. It employs 60% of the country's labour force of over 10 million. Agriculture also accounts for 65% of total exports and supplies over 70% of raw materials for the agro-industry. Overall the sector contributes to more than 45% of government revenue, although only 15% of Kenya's total land area has sufficient fertility and rainfall to be farmed, and only 7 or 8% can be classified as first-class land. Sustainable land use practices in agriculture are central to improved production levels. However, degradation of agricultural land and conversion of the land to other uses and over reliance on rain-fed agriculture is threatening the country's productive capacity and long-term food security.

1.1.3. Forests

The current forest cover of 6.99% of the land area of the country is still below the constitutional requirement and global obligation of 10%. Forests contribute directly and indirectly to the national and local economies through revenue generation and wealth creation, and it is estimated that forestry contributes to 3.6% of Kenya's GDP, excluding charcoal and direct subsistence uses (National Forest Policy 2014). Forests also support most productive and service sectors in the country, particularly agriculture, fisheries, livestock, energy, wildlife, water, tourism, trade and industry, contributing between 33 and 39% of the country's GDP. Biomass comprises about 80% of all energy used in the country. Forests also provide a variety of goods, which support subsistence livelihoods of many communities. Forests comprise the country's water towers and catchments, where over 75% of the country's renewable surface water originates, and therefore serve critical water regulation roles which are important for human livelihoods, irrigated agriculture and production of hydro-electric power.

Kenya's forest resource has been degraded by subsistence activities and de-gazettement or conversion to other uses (mainly agriculture) and decades of illegal over-harvesting for timber, fuel wood, and unregulated grazing and charcoal burning. Deforestation in Kenya is estimated at 50,000 hectares annually, with a consequent yearly loss to the economy of over USD 19 million (National Forest Policy 2014).

According to a joint Kenya Forest Service (KFS) and United Nations Environment Programme report (UNEP 2008), between 2000 and 2010 Kenya lost 6.5% of its forest cover. This *deforestation is estimated to have led to an economic loss worth* Kenya shillings (*KES) 5.8 billion (USD 68 million) in 2010 and KES 6.6 billion in 2009.*

1.1.4. Charcoal

Charcoal is a key bio-energy source in Kenya, providing domestic energy for 82% of urban and 34% of rural households. The charcoal industry creates jobs for charcoal producers, transporters and vendors. A study by Energy for Sustainable Development Africa (ESDA 2005), now called CAMCO, in 2005 showed that approximately 200,000 charcoal producers and an estimated 500,000 people are engaged in the charcoal trade as transporters and vendors. These people in turn support 2.5 million dependants. The study also showed that the potential government revenue stood at over KES 5.1 billion if sufficient efforts were invested in effective collection of government revenue. Charcoal represents an estimated annual market value of over KES 32 billion. A 2005 policy brief by the World Agro-forestry Centre indicates that with adequate availability of wood, it is possible for producers and traders to earn between 240,000 and 720,000 KES per year. This suggests that if properly managed the charcoal industry can be a strong contributor to the national economy

Even with its importance as a source of livelihood and affordable energy, charcoal production largely remains uncoordinated and unsustainable and is a major cause of deforestation and land degradation. With the exception of efforts to limit production, the charcoal sector has until recently received very little national interest. The Government has however recognized the urgent need to regulate the charcoal sector to insure sustainable development as reflected in National Forest Policy 2005 & 2014). Actions towards this end include the establishment of self- regulating Charcoal Producer Associations for sustainable charcoal production. The Forest Act of 2005 section 59 provides for formulation of rules for regulating the production, transportation and marketing of charcoal. These rules were gazetted in December 2009 as The Forest (Charcoal) Rules, 2009. The Regulations provide guidelines for formation of Charcoal Producers Associations and legal requirements for producers, transporters, and traders engaged in the charcoal business (Mutimba et al.2005).

1.1.5. Rangelands

Rangelands are lands on which the native vegetation is predominantly grasses, shrubs, bush-lands and woodland suitable for grazing or browsing use. These landscapes are further characterized by poor vegetation cover, fragile soils and relatively high temperatures. Spatially rangelands overlap ASALs that support about 70% of the national livestock herd and are home to about 10 million people (or about 34% of the population) (GOK 2004). The rangelands also support pastoralists and agro-pastoralists. Receding rangelands threaten the very basis of the livelihood and the way of life of the pastoralists.

A majority of Kenya's National Parks and National Reserves are located within rangeland ecosystems spanning roughly 10% of the country's land area. It is also estimated that about 50% of wildlife outside the national parks is found in these range areas. Indeed, Kenya's wildlife constitutes a unique natural heritage of great national and global importance.

1.1.6. Livestock

The livestock sector contributes 10%-12% of GDP and 47 % of agriculture GDP and employs 50% of the agriculture sector work force and about 90% of ASALs work force (KBS 2010). The sedentarization of the pastoral communities has constrained the movement of livestock, leading to overgrazing. The limited benefits from conservation of wildlife in most ASAL areas, increased sedentarization as well as risks from wildlife attacks have necessitated the increase in livestock numbers to improve incomes. This has led to overstocking of livestock resulting in further land degradation, as the ecosystem cannot support the increased demands for limited resources.

1.1.7. Nature Based Tourism

Tourism, Kenya's largest source of foreign exchange, accounts for about 10% of the GDP. In 2011, the direct contribution from travel and tourism to GDP in Kenya was 5.7%, generating 313,500 jobs – 4.8% of total employment (KBS 2010). The industry is mainly driven by natural resources, particularly wildlife viewing in natural habitat, which is the primary objective for about 80% of the international visitors to Kenya (WRI 2007), and therefore bears a close and direct connection to and dependency to the natural resource base. If properly managed, nature based tourism can be an effective tool for the conservation of the environment. It offers opportunities for diversifying livelihoods. However, land degradation in landscapes that are home to wildlife and uncontrolled tourism are starting to disrupt natural systems and sometimes causing irreversible damage and declining wildlife habitats and wildlife, numbers undermining the principal tourist attractions (WRI 2007).

1.1.8. Minerals

Minerals are a non-renewable natural resource. Their extraction in Kenya is rapidly developing into a potentially high contributor to economic growth. The extraction, which is undertaken either as large scale or small scale (artisanal) activities, poses significant risks to the environment. The risks include on site and access to site that demand land use change and degradation of above natural resources; displacement of local communities; and change from environmentally friendly subsistence to monetary and market lifestyles. Open cast mining of stones and sand also exposes delicate landscapes to soils erosion and degradation. A new law and policy are underway to harmonize mining with the Environment Management and Coordination Act of 1999 that requires initial Environment Impact Assessment (EIA) and a restoration and rehabilitation of mined out areas. These actions will prevent degradation of the landscapes while cushioning of local communities against adverse effects of extraction of minerals.

2. Key Land Degradation and Sustainable Land Management Issues

2.1. Introduction

Land degradation is caused by multiple direct and indirect factors. It occurs because ecosystems are extremely vulnerable to over-exploitation and inappropriate land uses

that result in underdevelopment of economies and in entranced poverty among the affected population. Whereas over cultivation, inappropriate agricultural practices, overgrazing and deforestation have been previously identified as the major causes of land degradation and desertification, it is in fact a result of much deeper underlying forces of socio-economic nature, such as poverty and total dependency on natural resources for survival by the poor. Land degradation problems are best understood within the dictates of disparities of income and access to or ownership of resources.

As indicated above in the previous section, the Kenyan economy relies heavily on natural resources. However, Kenya's huge potential for economic growth is threatened by environmental degradation. Demands for subsistence and economic development together with pressures from the increasing population are leading to unprecedented land use changes. The United Nations define land degradation as reduction or loss of the biological or economic productivity and complexity of rain-fed cropland, irrigated cropland or range, pasture, forest and woodland. This corresponds to ELD Initiative definition of the reduction in the economic value of ecosystem services and goods derived from land as a result of anthropogenic activities or natural biophysical evolution. Degradation manifests itself in many forms; among them are soil erosion, silting of water bodies, loss of soil fertility, reduced vegetation cover, and the reduced overall ecological carrying capacity of landscapes. Different categories of land use professionals describe resultant land changes differently. Range managers define degradation as reduction of the quantity and nutritional quality of the vegetation available for grazing. Agriculture focus is decrease in exposure and loss of top fertile soil arising from inappropriate agricultural practices. To foresters, degradation is decrease in area covered by forest-land/or decrease in quality of forest condition. In the mining sector degradation is evidenced by excavation without rehabilitation, overburden dumping and pollution and contamination of soil by waste from mining. It is important to have a commonly agreed understanding and definition of land degradation. Landscapes are inhabited by communities who often have different cultures, values and lifestyles. Consequently the prevailing diverse socio-economic and ecological environments require equally diverse array of approaches and procedures to use land sustainably and to reverse effects of already degraded landscapes. Similarly the challenges and issues related to managing and integrating land and natural resources to meet subsistence and economic demands are many, equally diverse and complex.

Sustainable Land Management is defined by the ELD Initiative as the adoption of land use systems that enhance the ecological support functions of land with appropriate management practices, and thus enable land users to derive economic and social benefits from the land while maintaining those of future generations (ELD Initiative 2013). Appropriate management techniques integrate socio-economic principles with environmental concerns so as to maintain or enhance production, protect the natural resource potential, and mitigate problems associated with poor land use. An assessment of the land degradation hazard in showed that 12.3% of the northern rangelands are subjected to severe land degradation while 52% of the rangelands are vulnerable to

"moderate" land degradation. Only 33% faces "slight" vulnerability to degradation (Macharia 2004).

Unsustainable use and degradation of natural resources pose a huge cost to the economy and jeopardize the possibilities of future generations to enjoy the same or even better levels of ecosystem benefits. The heavy dependence of Kenya's economy on its natural resources implies innate risks of degradation and requisite economic and social costs. These costs are rarely calculated and included in national accounting and are often masked by the more visible short term benefits associated with degradation. Table 1 below provides a summary of the cost of degradation in the renewable resource sectors of the economy.

Table 1: Economic cost of environmental degradation to the Kenya

Sector	Cost of environmental degradation (% of GDP)	Cost of environmental degradation (Billions of KES of GDP)
Forestry	0.3	6.6
Agriculture (soils)	3.8	1,149
Climate change	2	604

Source: Draft Report Economic Assessment of Kenya's Environment and Natural Resources (2013) UNDP-UNEP PEI.

It is important to note that the impact of costs of environmental degradation fall disproportionately more on the poor segment of the population who depend on natural resources for their livelihoods. In essence these costs jeopardize the goals of poverty alleviation. In addition, the cumulative impacts and costs of environmental degradation become large over time. The more degraded a resource is, the more difficult it is to rehabilitate hence the higher the costs.

We continue to witness an acceleration of environment/land degradation despite research, continuous capacity building and financial investments, targeted programmes and commitments at various levels. The ELD Initiative which focuses on creating efficient and practical tools and methodologies for establishing the full value and economic potential of land and the costs of land degradation offers the opportunity for informing decision making and identifying concrete actions for sustainable land management.

Below is a cursory review of some of the key land degradation and sustainable land management issues at global, regional, national, county, and landscape and individual land owner levels.

2.2. Consequences of Overexploitation of Natural Resources

Loss of vegetation occurs when people cut forests, woodlands and shrub-lands to obtain timber, fuel wood and other products at pace exceeding the rate of re-growth.

Overgrazing of natural pastures occurs when stocking intensities are above the carrying capacity. The result is loss of grass cover exposing the land to wind and water erosion. Similarly in some popular protected areas with sensitive soils like Amboseli National Park the grasslands are also degraded by high visitor numbers through off-road driving. Most land based production systems, like agriculture and tourism often cause both positive and negative side-effects, by-products or externalities that are not accounted for in markets. These by-products tend not to be priced in the market and, hence, their economic values are unknown or difficult to assess. Though the systems can generate large amounts of money they often have substantial negative impacts on capital assets and long-term adverse effects on the environment. In addition, applying concepts such as the 'polluter pays' principle, cost recovery and cost sharing may prove unrealistic, impractical or politically disastrous to governments in countries where millions of poor people are trying to make a living on marginal lands.

2.3. Human Population

The current population of Kenya is just over 40 million, with an annual average growth rate of about 2.7% and expected to reach about 70 million by 2030 (Kenya Bureau of Statistics, 2011). The population continue to exert increasing pressure on the limited and finite natural resources. For example, sub-division of land into small uneconomical and unsustainable parcels and their overuse often leads to land degradation. Improper agricultural practices like cultivation on steep slopes and marginal areas occur under high human densities. Depletion of soil nutrients and re-using land before it has recovered also results in degradation of the land. However, high population density is not always related to land degradation, rather, it is the practices of the human population that cause soil erosion and, land degradation.

2.4. Poverty

In addition to affecting posterity and economic growth potential, environmental degradation has huge economic consequences for the poor. Poverty adds additional pressure on natural resources, since the resources represent the main means of subsistence for the poor. The poor are therefore frontline victims of natural resource depletion and degradation.
Poverty and environment are linked in a "downward spiral" in which poor people, forced to overuse environmental resources for their daily survival are further impoverished by the degradation of these resources. This situation requires searching for innovations and interventions that promote poverty eradication and sound environmental management.

2.5. Land Use Changes Associated with Unplanned Human Settlements

Activities related to lack of planning which result in in degradation of landscapes include unchecked establishment of settlements along wildlife corridors and dispersal areas, and spontaneous and unplanned human migrations to ASALs. Clearance of vegetation and subsistence farming in these marginal areas undermines carrying capacity leading to

degradation and loss of long-term productivity of the land.

2.6. Institutional Coordination and Sector Based Programming

Many landscapes are of interest to investors in sectors such as nature based tourism, forestry, wildlife management, livestock, agriculture, infrastructure, and extraction of minerals. The range and number of stakeholders operating in a landscape can be a threat if not properly coordinated. Lack of cohesion between interest groups can lead to competition for space and resources thereby diminishing intended sustainable land management outcomes. Government ministries, departments, and development partners often use different planning procedures and approaches with little room for change. Though land degradation cuts across all sectors, land use planning and use of natural resources in a landscape is currently segmented with each sector operating separately The lack of coordination and pursuit of different and often overlapping mandates results in competing sustainable land management initiatives that fail to fully address and integrate land degradation and sustainable land management.

National land related policies are implemented by different institutions at different levels. Overall oversight is the responsibility of the national government. The 47 county governments also have responsibility to make subsidiary policies and legislations provided these do not conflict or contradict the national level ones. Within the county the land owner is the custodian who manages and uses the land. This means that there should be elaborate links and operational partnerships between the national and county governments, and with individual land owners. Such partnerships must clearly elaborate the roles and responsibilities of each partner.

2.7. Climate Change

The impacts of climate change together with strategic focus intervention to confront climate change are articulated in the National Climate Change Response Strategy that was finalized in 2010. In 2013 the government launched the five years National Climate Change Action Plan to roll out the strategy including ability the county's ability to take advantage of opportunities emanating from climate change. The current and future impacts of climate change are also well analysed in the Kenya Threshold 21 (T21) Model. On average, Kenya experiences drought every five years. Because most farmers practice rain-fed agriculture, which has proven to be unsustainable, climate change has negative impacts on agricultural and pastoralism livestock production, on supply of water resources forests and biodiversity. On the whole climate change is continuously reducing productivity, benefits and the total value of Kenya's landscapes. The induced soil erosion reduces land that can support agriculture.

Climate change has also caused changes in the structure of ecosystems and ecological processes, resulting in deterioration in vegetation cover and decrease of water resources, making resource management and natural regeneration more difficult.

To mitigate these impacts that are linked to land degradation, climate change must be mainstreamed in planning at all levels. Mainstreaming ensures vulnerability assessments are integral to major policy decisions and also facilitates a coordinated planning response across sectors and planning for natural resource management.

2.8. Targeted Research

Kenya has many research institutions with scientific and technological potential to solve the problems of land degradation and sustainable land management (including KARI, KEFRI etc.); however though significant milestones have been achieved in areas like development of dry land crop varieties, the country lacks a comprehensive policy on application of science and technology that includes land degradation. In addition, the roles of the institutions in sustainable land management are unclear. Research is needed in documenting land degradation processes and sustainable land management practices, and their impacts in different contexts together with trials for optimizing adoption of research findings under different conditions, and developing new technologies. Other research opportunities exist in identification and development of non-wood products, medicinal plants, confectionery and microbes.

2.9. Information and Knowledge

According to Bai and Dent (2006), to date there is no authoritative measure of land degradation or sustainable land management. Kenya is no different, therefore there is a pressing need for information to support policy development, environment integrity and strategies and programmes for development and conservation of natural resources. Information is vital in better knowing, appreciating and understanding what land is worth and importance of investing in sustainable land management. Data and information are required to establish status, trends in different values of natural resources, values of different land uses and best investment options and innate risks. We also need information for planning, prioritization of issues, establishing the costs and benefits of land degradation, formulation of strategic interventions, mobilization of resources and overall decision making. Information is also processed to generate knowledge products for use by extension workers and resource owners.

2.10. Financial Resources and Inadequate Investments

Sustainable land management initiatives require sustained financial resources. Funding for innovative sustainable land management initiatives requires huge financial resources both from the government and development partners. Currently the level of funding from government and from development partners is relatively low (NAP 2008-2018). Sometimes development partners' support is unsustainable due to inadequate national ownership and phase out procedures. Other factors related to funding include; complex and lengthy programme and project formulation processes, poor coordination and complex, lengthy disbursement procedure. On land utilization *per se* there are also the issues of lack of fiscal guidelines for facilitation of efficient utilization of land and for

provision of incentives for sustainable land uses. Opportunities to mitigate the fiscal gap include promoting innovative domestic resource mobilization and developing policies and economic instruments for improved access to national finance, external finance and private sector investments. Alongside there is need for enhanced appreciation, within the National Treasury and in the Ministry Devolution and Economic Planning, of the value and contribution of land/natural resources and the importance of investing in resource sustainability.

2.11. Land Administration and Governance

Chapter 5 of the Kenya Constitution 2010 outlines the principles of ownership and use of land. The Constitution (Chapter 5 Sections 60 – 68) points out that all land in Kenya belongs to the people collectively as a nation, communities and individuals and classifies land into public, community and private or individual. Public land in Kenya refers to land un-alienated by the Kenya Government, used or occupied by a state organ, which no individual or community ownership can be established, minerals and mineral oils, government forests, and game reserves, national parks and roads. Public land is will be held in trust for the people by the national government or a county government and administered on their behalf by the National Land Commission. Community land is held by communities on the basis of ethnicity, culture or similar interest. Community land comprises land registered in the name of group representatives, transferred to a specific community and land held, managed or used by communities as community forests, grazing areas or shrines, ancestral lands and those traditionally occupied by hunter – gatherer communities, held as trust land by the county governments. Private Land in Kenya consists of land held by a person under freehold tenure and leasehold tenure. A non-citizen can only hold land on leasehold tenure, and the lease cannot exceed 99 years.

Further the constitution also demands development of a national land policy and enactment of a range of legislations to ensure that land use is efficient, productive and sustainable. Under the same constitution the state is obligated to ensure sustainable exploitation, utilisation, management and conservation of natural resources.

The three arms of the national government; national assemblies, the executive, and judiciary and requisite national level institutions have the roles of developing and enforcing policies, legislations and guidelines to prevent land degradation and to achieve sustainable management of land and natural resources.

Under the devolved system of governance, county governments are responsible for the formulation of county level policies and legislations on land use and sustainable land use options, maximising benefits, ensuring equity and preventing human conflicts associated with decreasing land resources. Under the current law the land owner has the right to determine how his land is used despite the consequences of such use. Due to poor law enforcement and corruption the landowner can change land use type for maximum short term benefits that can have severe degradation consequences. County governments will

gradually and increasingly take on a bigger role in guiding management of land and natural resources with a view to generate more revenue.

Land administration and governance issues affect the level of commitment and adoption of long-term sustainable practices because they play a key role in ownership, value and use of land. Disparities in land ownership, including the exclusion of women in land decision making processes (despite women's role in management of land and resources therein) can results in inadequate management of land and land based resources. Lack equity in benefits sharing especially in affected local communities can cause conflicts that can in turn enhance land degradation. Good governance implies that all stakeholders are represented at decision-making. Good governance also means that actions and initiatives are commonly identified and agreed.

The most vulnerable persons in Kenya include subsistence farmers, pastoralists, hunters and gatherers. This segment of society is culturally dependent on ecologically sensitive habitats and resources therein. Over the years, most of these communities have lost both their rights to access land and to land-based resources that are key to their livelihoods. In some areas the disruption of these livelihoods and adoption of new unsustainable livelihoods has resulted in land degradation.

Women, because of their roles in society, are active agents of sustainable land management. To strengthen and enhance their role it is necessary to give women right to land. Alongside it is important to create enabling conditions to build women's capacities for productive and sustainable use of natural resources. The youth aged between 15 and 35 years constitute almost 60% of Kenya's population, and form the country's link with posterity (KNBS 2012). Youth can therefore play critical roles in sustainable land management including decision making in environment governance.

2.12. Institutional Framework/Arrangements

Kenya is aware and committed to land and environment concerns at the local, national and even global levels. At the global level and in consonance with Article 2 (5) (6) of the Constitution of Kenya ratified treaties and conventions have been domesticated to be part of the laws of Kenya. According to the National Council for Law Reporting the international conventions, protocols, treaties, include the Multilateral Environment Agreements such as such as the Convention on Biological Diversity (CBD), United Nations Framework Convention on Climate Change, United Nations Convention to Combat Desertification (UNCCD), Kyoto and Montreal Protocols. Towards fulfilling the obligations the country has domesticated the global conventions by ensuring that national policies, strategies, action plans and programmes incorporate the obligations therein at all levels.

Kenya participated in the negotiations of the Convention to Combat Desertification. The negotiations established the United Nations Convention to Combat Desertification (UNCCD) that was signed in 1994 and which came in to force in 1996. The convention main objective is to combat desertification and mitigate effects of drought in countries

experiencing serious drought and/or desertification particularly in Africa. The convention also establishes the National Action Plan (NAP) tool for identifying and prioritising concerns, needed interventions and requisite costs. The convention envisaged NAP to be supported by international cooperation arrangements. Kenya signed the UNCCD in 1994 and ratified it in 1997 and finalized her inaugural NAP in 2002 (GOK 2002). The country has also prepared a second NAP that covers a duration of ten years from 2008 t0 2018 that reflects the changes that have occurred locally and internationally.

From the development of first NAP, Kenya has made significant progress in the implementation of UNCCD. The NAP developed through highly participatory processes, also serves as important tool in guiding the implementation, donor coordination and monitoring of efforts in combating desertification and strengthening of capacity of various stakeholders. The NAP has been integrated into socio-economic policy frameworks, including the national Economic Strategy for Wealth and Employment Creation, the Manifestos of governing political parties, the new constitution and the Arid and Semi-arid Lands Policy. The NAP has also been included in a number of sectoral environmental protection plans. Other than producing the NAPs, the participatory NAP process was powerful in awareness raising, educating and mobilizing various stakeholders and therefore empowering them on drought and desertification issues. It also triggered and resulted into institutional and legislative reforms to deal with drought and desertification. As part of the NAP process Kenya launched the Kenya Desertification Community Trust Fund in June 2004 that has assisted in the implementation of priority activities. Kenya has also established NEMA as the National Coordinating Bodies (NCBs) in accordance with the provisions of the UNCCD to coordinate, guide and provide leadership for desertification control activities.

Kenya has also participated in several sub-regional initiative that aim at strengthening systems for monitoring, early warning and adaptation to drought and desertification such as Intergovernmental Authority on Development (IGAD) Climate Prediction and Applications Centre (ICPAC) and the NEPAD Environment Initiative (EI) which includes combating desertification as an integral and one of its priority program areas has been developed by UNEP under the guidance and leadership of the African Ministerial Conference on Environment (AMCEN).

The country has also benefitted from Bilateral and multilateral arrangements in financing implementation of the UNCCD and sustainable land management related initiatives in Kenya. Global Environment Facility (GEF) continues to provide support for the implementation of UNCCD trough programs and projects to combat desertification and mitigate drought impacts. The GEF projects include the on-going UNDP implemented "Mainstreaming Sustainable Land Management in Agro-Pastoral Production Systems of Kenya" and the "Kenya Adaptation to Climate Change in Arid Lands".

Towards targeted capacity building, various institutional and human resources capacity building programmes in support of domestication of UNCCD have been implemented in Kenya with support of development partners. The UNDP Integrated Dryland

Development Programme coordinated by its Drylands Development Centre is helping Kenya among others things mainstream/integrate NAPs into national economic frameworks and move from strategy development to effective implementation of the UNCCD including through resource mobilization. At the Africa regional level Kenya has committed to several treaties. Another initiative which Kenya subscribes to the New Partnership for Africa's Development (NEPAD) Environment Action Plan a coherent, strategic, and long-term programme of action that aims to promote Africa's sustainable development by putting in place measures and investments that will ensure that the continent is able to confront its short-term economic growth challenges without losing sight of the long-term environmental, poverty eradication and social development imperatives. The programme priority sectors and cross-cutting issues include combating land degradation; drought and desertification; invasive species; cross-border conservation of natural resources; climate change; and cross-cutting issues including capacity-building and technology transfer among others.

At the sub-regional level, IGAD has an elaborate program to support member countries' agriculture and to ensuring that policies are based on rational use of natural resources to achieve sustainable development. The priority thrust for the programme are agricultural development and food security, natural resources and energy, environment protection, dry-land agricultural and technology. Kenya also subscribes to the East African Community Protocol on Environment and Natural Resources Management.

At the national level there are many institutions dealing with land degradation and sustainable land management. To a large extent, the existing institutional framework for land sustainable land management is highly centralized, complex, and exceedingly bureaucratic. The current institutional arrangements need to be reviewed so as to enable all stakeholders at all levels to effectively participate in sustainable land management initiatives. The institutions include:

- Department of Resource Surveys and Remote Sensing (DRSRS)
- Ministry of Environment, Water and Natural Resources
- Ministry of Devolution and National Planning
- Ministry of Agriculture, Livestock and Fisheries
- Public and Private Universities
- Ministry of Tourism and East Africa Community
- National Environment Management Authority (NEMA)
- National Gene Bank of Kenya
- Kenya Forest Service (KFS)
- Water Resource Management Authority (WARMA)
- Kenya Wildlife Service (KWS)
- Kenya Agricultural Research Institute (KARI)
- Kenya Plant Health Inspectorate Services (KEPHIS)
- Kenya Forestry Research Institute (KEFRI)
- National Environment Council (NEC)

- National Council for Science and Technology (NCST)
- National Land Commission
- Ministry of Lands, Housing and Urban Development

Under the devolved governance, county governments are responsible for agriculture, land survey and mapping; implementation of specific national government policies on natural resources and environmental conservation, including soil and water conservation; and forests. County government will increasingly play a major role in engaging local communities and land owners through formulation of county level policies and legislations on land use and sustainable land use options, maximising benefits, ensuring equity and prevention of human conflicts in light of decreasing land resources due to land degradation.

2.13. Policy Framework

As already indicated, the new constitution outlines the principles of ownership and use of land and demands development of a national land policy and enactment of requisite legislations for efficient, productive and sustainable use.

Land management issues require appropriate policy framework and responses with long-term national interests. The Kenya government has formulated many closely related policies that are relevant to sustainable land management. The report on the review of policies related to sustainable land management (2013) undertaken under the GOK - GEF "Mainstreaming Sustainable Land Management in Agro-pastoral Production Systems of Kenya" project found that implementation of the many policies has not been well coordinated, resulting in dispersed decision making across sectors involved in sustainable land management. The review also identified opportunities for convergence and on possibilities for an integrated approach to sustainable land management through harmonization.

Further, the review examined the effectiveness of the policies and bottlenecks that constrain the mainstreaming of sustainable land management. Other issues related to the policy dimension include lack of innovativeness in policy formulation, poor coordination of the formulation, lack of coordination in implementation and reactive rather that proactive formulation of policies.

Achievement of the overall sustainable use of natural resources requires approaches that integrate objectives of the many policies alongside sound economic valuations which can be applied practically to inform decision making. The ELD Initiative approach and methodology offers an opportunity for realizing this goal. Kenya has a many diverse cross-cutting policies that aim to prevent land degradation and to guide sustainable land management (See ***Annex I***).

2.14. Partnerships

There are many multilateral, bilateral, UN, International Organization and CSOs partners who support sustainable land management in Kenya (Annex II). The supported interventions areas include policy and legislative framework reforms, advocacy, capacity building, research, technology transfer and infrastructural development. However, the impact of the support has not been fully realized due to inadequate coordination. When political leadership and governments of the development partners change, they often come with changes in development priorities, strategic objectives and funding levels.

2.15. Capacity Building

Capacity building is needed to enhance the ability to address issues of land degradation and sustainable land management. Capacity is required in full programming cycle and wider related areas of environmental and sustainable land management. Further, there is need for capacity building that targets multi-stakeholder participation, consultation and decision making. There is also inadequate capacity for application of current technologies for assessment, monitoring, and mitigation of land degradation. Another gap is inadequate manpower to develop and maintain sustainable natural resource management techniques. Partnerships under the ELD Initiative can fast track capacity development in its areas of focus particularly in the valuation and economics of natural resources.

2.16. Community Participation and Involving Resource Owners

Until recently the role of communities in sustainable land management has received inadequate attention. Donor conditionalities and new policies and legislation frameworks have however made involvement of local communities central in some cases. The frameworks have created space for contributions, involvement and consultation of communities in planning, programming, decision making, and sharing of benefits from sustainable land management. In future, opportunities need to be created to enable communities acquire knowledge and appreciate benefits of sustainable land management, and to evaluate for themselves the relative costs and benefits of different land use options. Further there is need to create mechanisms by which communities can assess their own performance and share experience and knowledge with other stakeholders.

2.17. Inadequate Planning

Planning regards future courses of action that take in to account prevailing environment and available resources. Planning is therefore a basic sustainable land management function that helps to identify alternatives within the available resources and circumstances. In Kenya there is limited application of landscape level, knowledge-based land use planning. Further, mainstreaming of land degradation and sustainable land management issues in national planning and budgeting processes is still limited. This

situation is exacerbated by factors such as: duplication of effort and inefficient use of resources due to multiplicity of uncoordinated public agencies dealing with land use management; lack of coordination between spatial and economic planning and lack of a national ecologically sound spatial plan for land use. The Kenya Threshold 21 Dynamic Model (T21 Model) analyses climate change related risks and impacts on development options and informs coherent national sustainable development planning. The primary challenge however still remains the management of the natural landscape as an integrated production system that includes inputs of local communities and individual land owners.

2.18. Refugees

Kenya hosts a large number of refugees as a result of civil strife in neighbouring countries. In 2013, Kenya had over 500,000 refugees (UNHCR 2014 Country Kenya Profile). Location of refugee camps in fragile ecosystems causes systematic ecological degradation due to overuse of resources such as land and fuel wood. Pastures are overstretched in already stressed environments. This reduces amounts and values of natural resources. There is an urgent need to put in place frameworks for planning and managing refugee camps.

3. Common Stakeholder Views and Concerns

3.1 Introduction

Participatory approaches and stakeholder consultations before start of programmes and project have been used in Kenya for quite some time. Consultative workshops, systematic field surveys, interviews, research and field studies are used to identify issues and concerns of stakeholders. The following views and concerns related to sustainable land management have been generated from forums of local communities, CSOs, private sector, research institutions, universities, government institutions and development partners. Some recurring concerns in land degradation and sustainable land management include research and technology transfer, research and uptake of research results, diversifying livelihoods, poor coordination of institutions and sustainable land management initiatives, inadequate financial resources, challenges of devolution and required capacities, alien invasive species and climate change resilience.

3.2. Research Technology Development and Technology Transfer and Uptake

Technology can refer to knowledge, product, process, methods and tools employed in making goods or services or viewed as the technique to support an activity such as hardware, software, and know-how or technical skill (Egbu and Lee, 2007). According to Tarek (2000), technology transfer refers to flow of technology and requisite knowledge from the owner to a receiver.

Sustainable land management related sectors that would benefit from technology transfer include: agriculture (increasing productivity per unit area and the value addition

of agricultural products through agrobusiness related processes), agro processing, agricultural research with special reference to bio-technology and drought management. Other sectors include efficient and affordable energy use and conservation practices; and forest and rangeland management, environmental management and biodiversity conservation.

The challenges and barriers of development and/or transfer of technology are many and range from economic, cultural, geographical and environmental barriers. The common challenges include: limited capacity for technology management, lack of skilled workers, and lack of stable and sustainable financial resources. Successful technology transfer requires coordinated effort on a number of levels and fronts such as, capacity to adopt and adapt acquired technologies and research, training programs and national level supportive policies and guidelines.

3.3. Diversifying Livelihoods

One cause of land degradation is unsustainable overuse of resources. Local communities heavily or solely depend on a single lifestyle or a few lifestyles such as pastoralism and subsistence agriculture. In some cases there are unknown livelihood options in the same landscapes and/or other ways of diversifying livelihoods. Although a number of sustainable land management options that may minimize land degradation are available, their uptake is often quite low. One of the reasons is that efforts to reduce land degradation require behavioural change among land users in favour of sustainable land management and conservation practices. New livelihood options are developing steadily particularly in ASALs. Specialised niche markets and certification for specialized products and eco-friendly products are boosting exports from some ecologically stressed landscapes. Households are investing significant effort in strategic alternative livelihood options and are reaping benefits by mitigating the dire consequences of climate change and extreme weather events Mortimore et al (2009) reported that high value natural products trade was worth about USD 65 billion per year, largely on medicinal and cosmetic products such as aloe, and gum-Arabica. Honey and silk have indeed made in-roads in the Kenyan ASALs, and it is increasingly evident that economic diversification is driving the communities into greater participation in markets beyond their landscapes. To ELD Initiative methodology such diversification will result in equivalent expansion of the range and number of products thereby enhancing the total value of the natural resource base.

3.4. Inadequate Coordination of Institutions and Sustainable Land Management initiatives

There are many institutions in Kenya with initiatives to curb land degradation and to enhance sustainable land management. In addition we have many national and sectoral policies to facilitate the implementation of sustainable land management. The country also has an assemblage of land use related sustainable land management-related laws and jurisdictions scattered across sectors and institutions. Some of these laws contradict each

other, while others are unenforceable or redundant. Though dealing with land most of these policies do not mention sustainable land management. A further risk is that institutions, particularly government ministries and their portfolios keep changing. Every time there is reorganization valuable time is lost and coordination becomes more difficult. In light of this key institutional stakeholders have identified a need to develop a national framework to coordinate joint identification, formulation and implementation of these initiatives. This will require improving the institutional, policy, legal and regulatory framework that allows effective coordination at horizontal and vertical levels of government and with the private sector and civil society. Development of such a framework offers an opportunity to adopt and incorporate ELD principles.

3.5. Inadequate Financial Resources

The natural resource base offers best prospect for Kenya's sustainable development. This calls for enhanced investment and allocation more financial resources to sectors dealing with natural resources and putting in place measures to ensure effective use of resources. Financial resources are needed in many areas including technology development, up-scaling best practices and innovation and implementation of strategic plans and programmes. However, available statistics point a gloomy picture in terms of budgetary allocation and utilization. The latter is characterized by low absorptive capacity, financial leakages and corruption. To be able to proactively adopt ELD Initiative, there is a need for a comprehensive analysis of levels and flows of financial resources in government institutions and external stakeholders. Innovative financial mechanisms with the private sector, increasing domestic budgetary allocation and access to global financial facilities like GEF will help bridge current financial gaps.

3.6. Devolution Challenges and Required Capacities

Centralised decision making, control and enforcement of natural resource management through government agencies, have often proven ineffective and brought about resource degradation rather than sustainable use (Wyckoff-Baird, 1997). The objective of devolution as encapsulated in the new constitution captures the aspirations of Kenyans in terms of popular participation in decision-making, access to opportunities and equitable sharing of resources. In addition, by bringing government decision making closer to the people, devolution is widely believed to increase public sector accountability and effectiveness. The main assumption underpinning devolution in natural resources is that greater participation in decision-making is a positive good in itself, and has multiple benefits. It is in light of this that counties are asserting their rights over natural resources. A real concern is that currently county governments lack the capacity to undertake effective natural resource management including capacity for evidence-based planning, budgeting, monitoring and community engagement in development processes at county level.

3.7. Alien Invasive Species

Kenya has had several invasions of alien species that have had negative impacts on biodiversity, agriculture and requisite significant socio-economic consequences (Keil, 1988). Notable examples include the larger grain borer (*Prostephanus truncatus*) (Hodges *et al.*, 1983; Muhihu and Kibata, 1985), and *Prosopis* spp. Available information on invasive species shows that some 34 different species that have invaded Kenya (Farrell, Kibata and Sutherland, 1995; Lyons, 2000) , include 11 arthropods, ten microorganisms, nine plants and four vertebrates. Few of these species are under control, hence the concern. Invasive alien species become predators, competitors and parasites thereby threatening integrity of ecosystems and native species. In addition to the damage alien species become increasingly expensive and difficult to manage once they get established.

Management strategies include quarantine measures, eradication, containment and control, monitoring and research, regional cooperation and public awareness. A draft strategy for the management of invasive alien species in protected conservation areas in Kenya was completed and launched by the Kenya Wildlife Service (KWS) in 2013. The strategy seeks to identify mechanisms that respond to the invasive alien species challenge in Kenyan protected areas. The strategy will also encourage collaborative ventures on control and management of invasive species in protected areas and other biodiversity critical landscapes.

3.8. Climate Change Resilience

Kenya will continue to experience significant changes in precipitation and temperatures, with some places becoming wetter and others drier. These changes will impact on land productivity and the distribution and composition of natural vegetation that forms pasture for livestock and wildlife, and upon which many people depend for their livelihoods. Similar changes will be esperienced across ecosystem based goods and services leading to major impacts on productivity and the ability of these services to sustain livelihoods.

Responding to climate change will require systematic action at all levels of development planning and implementation. This action would aim to reduce the impacts of climate change by protecting resources, livelihoods, homes, assets and services.

Kenya needs to strengthen capacities to anticipate, cope, resist and recover from climate change shocks. These capacities together are termed “resilience”. Resilience includes proactive measures that reduce exposure, vulnerabilities and risks. In order to effectively meet the challenges and uncertainties of climate change, development strategies and processes must be rendered climate resilient. Such strategies and processes will not only serve as the programmatic nexus for capturing conventional and innovative sources of sustainable development but also sustainable land management financing.

4. Existing Gaps in Knowledge, Tools and Approaches

4.1. Information and Knowledge on Biophysical and Socio-economic Conditions

Knowledge gaps on the biophysical and socio-economic conditions, making it difficult to harmonize the competing demands on the natural resources.

There is limited knowledge on the structure, function and dynamics of most ecosystems and landscapes. If available the knowledge would be of great value in establishing values of available options for the type(s) of land use to be used in a particular landscape. Where information and/or knowledge exists it is often sectoral and segmented and often not based on long term monitoring. Generating this knowledge will require appropriate tools at different levels. Ground sampling of the biophysical environment, interviews with resource users, aerial surveys and remote sensing are some of the tools that need to be adopted and applied regularly. Baseline studies are also needed on the operations and shortcomings of institutions with land management mandates at the national, county and land owner/landscape levels. In addition, knowledge is needed on the socio-economic dynamics of resource users and reasons for the land uses in operation.

4.2. Environmental Economics and Evaluation of Natural Resources

Environmental economics is a relatively new subfield of economics concerned with the relationship between the economy, the environment and sustainability. It is concerned with both the use of resources as well as the negative impacts resulting from the use.

In Kenya, compared to other fields of economics, environmental economics has yet to take root in training and learning institutions which means that the number of professionals and advocates of environmental economics is also relatively small. Most practicing economists are mainly concerned with description and analysis of the production, distribution, sale, and consumption of products (goods and services) without taking into account long-term impacts (Nkonya 2006) externalized costs when determining value. From an environmental economics perspective, land degradation during production may occur without adding any cost to final product thereby making the land degradation functionally left out of the market's price determination and financial value of the product. Therefore, a product produced without land degradation and a product produced with land degradation may find the same market price. Although it may cost more internally, in the form of money, to produce the product without degradation, the actual costs may be much greater for the degrading product. The long-term costs in terms of health, clean-up, and environmental aesthetics from the land degradation can make the real cost much, much greater, but currently the market has no way of expressing that larger price. In Kenya today, a natural resource is given value in terms of its current contribution to the economy or contemporary livelihood source irrespective of negative impacts. However, few tools are gradually being used to take care of or reduce external costs such as environment impact assessment and economic incentives for environment protection. The country needs to increase capacity in environmental economics, and to develop tools

for valuing the environment, land and natural capital including environmental services together with establishing the costs and benefits of land degradation.

4.3. Inadequate Knowledge on Carrying Capacities of Landscapes

The carrying capacity is the maximum number of organisms which can be sustained by an ecological system or a landscape. Reduction of the landscape in terms of area or amount of resources in it reduces the landscape's carrying capacity. The scarcity of productive land, overuse of land, and overgrazing and population shifts to marginal lands are manifestations of the results of exceeding capacities of available land. Kenya needs to establish the quantities, qualities and spatial extent of above and below resources in landscapes. The carrying capacities will be useful in valuation of natural resources, establishing baselines for developing appropriate interventions and identifying technologies that can increase to some extent, the carrying capacity.

4.4. Limited Use of Integrated Natural Resource Management

New production systems and practices that emphasize integrated nutrient and water management— for example, no-till production, conservation tillage, or mixed cropping and agroforestry significantly increase resource use efficiency and also facilitate sustainable land management. The conservation of native above and below-ground biodiversity is often required for sustaining ecological processes and to maintain the resilience of most ecosystems. The stocks of available plant nutrients need to be managed to prevent consumption from exceeding availability and, where necessary, effective recycling of crop residues and manures ought to be supplemented by external inputs in order to sustain system function and productivity. Savannah landscapes with a mix of wildlife and livestock have been proven to be more productive and stable than when the two land uses are segregated. This is evidenced by adoption of conservancies approach.

4.5. Development and Adoption of Appropriate Technologies

Appropriate implies suitability or conformity with a particular purpose, place or existing conditions. Appropriate technology therefore that suits the environment and the social conditions is inexpensive. Such technology in needed in conservation agriculture, harnessing and using scarce water, resources, tillage and water retaining agronomy techniques and use of biomass energy. Despite its proven value appropriate technology has received little political support and minimal funding from the government. Further its development is limited by the need for well understood science.

4.6. Role of Private Sector

In light of weak common and centralised management regimes, under which natural resources are depleted, the private sector is increasingly becoming a potentially significant positive player and strategic partner in natural resource management. In Kenya, the private sector interface with natural resources is evidenced by the private

sector's prominent role in tourism, floriculture, agriculture and agro-chemicals and agro-based manufacturing industries. Conservancies are an innovative approach that leverages the increasing interest of the private sector to take part in conservation and sustainable land management. The conservancy works with landowners, communities, cooperatives and businesses to establish local groups that can use and protect land at the same time. The private sector also partners with local communities to avail funds for development of natural products including ecotourism products.

5. Challenges of Implementation of Sustainable Land Management Approaches

5.1. Introduction

A wide range of approaches are used for sustainable land management, either individually or as mix of approaches at the same time. **A common challenge to all of them is climate change**. The challenges and adverse impacts associated with climate change are compounded by local environmental degradation (National Climate Change Response Strategy 2010). The biophysical, socio-cultural, economic, and technological components and paradigm shifts in resource management practices have to be adapted to harmonize with the climate change. Adaptation measures include the prevention, tolerance or sharing of losses, changes in land use of location and restoration. The National Climate Change Response Strategy has proposed adaptation measures in key sectors of agriculture, livestock and pastoralism.

National policies, legislations, institutional frameworks and strategies to guide land management approaches are the responsibility of the national government while actual implementation of approaches such as community participation, local level incentives, zoning for integrated resource management and diversification of livelihoods falls within the mandate of county governments and individual land owners. Some of the common sustainable land management approaches and the challenges faced are elaborated below.

5.2. Participatory Approaches

Participatory approaches and tools are often embedded within sustainable land management action planning methodology. The main advantage of these approaches is the opportunity to listen to the needs and issues of access to natural resources, thus incorporating local knowledge in planning and implementation of sustainable land management initiatives. Participatory approaches are also open learning environments in which stakeholders learn from each other and base their decisions on knowledge sharing and consensus. For specific initiatives, the methodology starts with initial inception consultation for awareness raising and mobilisation, followed by planning, capacity building and implementation and, ultimately, monitoring and evaluation. In Kenya, participatory approaches and community involvement are a major component of the processes of formulating natural resources policies, strategies and programmes. Institutions such as Community Forest Associations, Water Users Associations and Farmer

Field Schools have been established as platforms to enhance community involvement. These approaches have also played a key role in integrating environment and poverty reduction into local level development planning (Adano et al. 2006).

However, these approaches are not a panacea to sustainable land management: they also face challenges. They are resource intensive, both in time and budgetary terms: group formation requires considerable skills and experience of extension staff to guide this complex process. There is also a certain risk that community members are influenced by vocal and locally respected or influential people. Further, participatory approaches strongly rely on commitment and leadership by local opinion leaders and impartial motivated government officers. Mobilization and awareness elements attract politicians who often interfere with groups for political advantage.

5.3. Integrated Natural Resource Management

Because all natural resources in a landscape are inter-related within a defined ecological system, they should be managed in an integrated approach that is conscious of the interactions among the different components. This has given rise to approach of Integrated Natural Resources Management (INRM). According to a definition of the INRM Task Force of the Consultative Group of International Agricultural Research (CGIAR), INRM is "an approach that integrates research on different types of natural resources, into stakeholder-driven processes of adaptive management and innovation, to improve livelihoods, ecosystem resilience, agricultural productivity and environmental services, at community and, ecosystem scales of intervention and impact" (Task Force on INRM, 2001). Kenya has adopted an INRM approach for sustainable land management, but there are challenges that include the spatial boundaries of landscapes, time taken for results of interventions to be realized, vested interests in different resources by some stakeholder, inadequate capacity and methodologies of assessing the impact of INRM due to complexity and diversity on interventions.

5.4. Targeted Policy and Institutional Support

When a policy, institution or legislation aims at affecting a specific group, it is said to be 'targeting'. Policies or institutions may be focused on individual resource owners, households, youth, women and communities as a way of addressing their specific needs. In Kenya, the pastoralist group ranches, water user associations, community forest associations and farmer field schools are examples of targeted approaches that aim to promote sustainable land management and use of natural resources. Challenges of targeted approaches include people receiving the targeted support but their circumstances are not materially improved; initiatives benefiting the untargeted members of the community; and failure to reach those at whom the initiative was targeted.

5.5. Incentives Approach

This approach aims at providing incentives to the resource users and local communities with the aim of motivating them to enhance adoption and practise and replicate sustainable land management or conservation of natural resources. Such incentives include provision of seeds, seedlings, planting materials, implements and tools; revolving funds and grants; direct cash wages for providing of labour; training and capacity building programmes; and technical guidance and support. In Kenya, incentives have been channelled by NGOs and through national programmes such as the Community Development Trust Fund, which supports initiatives that reduce threats and conflicts related to natural resources. The challenges associated with incentives approach include limitations of direct tangible benefits and time lags from conservation and land use intervention and failure to sustain the investments in terms of self-reliance, responsibility and ownership. Further incentives have often failed to address the belief and values that influence behaviour that is crucial for long-term natural resources and sustainable land management.

5.6. Livelihoods Expansion and Income Generation Approach

One reason for land degradation is overdependence on a single or few land use practices and lifestyles in a landscape, characterised by low-input, low-risk and low-output production. We find predominance of pastoralism or subsistence farming in our landscapes.

In recent years, however, value addition of farm and animal products is diversifying livelihoods, increasing financial incomes and reducing dependency on traditional products. Demand for "natural products" in Kenya is growing as evidenced by bee keeping and honey industry, aloe farming, butterfly farming; these wildlife farming practices that have opened new livelihood options. Medicinal plants and herbal medicine in Kenya are thriving and gradually developing sectors. Developing national and international markets for these products represents an opportunity to diversify livelihoods and to reverse land degradation.

Despite the favourable momentum, however, "natural products" are still relegated to local level and niche markets. The reason for this is often not so much supply constraints but rather a lack of market structure. Trade-related policies and institutions, incentives for investments and support policies need to be developed by county and national governments to support opportunities for diversifying trade using natural products for more sustainable use of natural resources.

5.7. Land Zoning Approach

Zoning refers to what can and cannot be done in different areas of a landscape in terms of natural resources use and management. It mitigates conflicts between different uses and users of the landscape. Zoning and setting aside unique and delicate habitats is a widely

accepted method to keep people out of sensitive, ecologically valuable or recovering degraded areas, and to limit the impact of unsustainable use. The zones reflect the intended land use, existing patterns of use, the degree of human use desired and the level of management and development required. Examples in Kenya include sanctuaries, protected areas and conservancies. The latter allows a combined mix of limited practice of agriculture, wildlife and livestock to share the landscape. The key challenges to zoning are lack of a national or county level land use control policy, current property and land rights and inadequate information and data to determine zoning criteria and the most suitable and sustainable use for particular areas.

6. Recommendations

Prevailing diverse socio-economic and ecological environments require an equally diverse array of approaches and procedures to use the land sustainably and to reverse and mitigate the effects of already degraded landscapes.

Participatory Approaches

1. Based on the sustainable land management project experience, it is highly recommended to make use of participatory approaches mandatory in identifying, planning, implementation and monitoring of sustainable land management interventions at a decentralised level. This will ensure community commitment, ownership and implementation efficiency.
2. In future, opportunities need to be created to allow communities to develop/acquire knowledge and for appreciation of benefits of sustainable land management, and to evaluate for themselves the relative costs and benefits of different land use options. There is also an urgent need to devise and implement participatory mechanisms for compensation for loss of land resulting when land is designated as in public interest for the sustainable management of natural resources.

Information and Data

3. More and diverse data and information related to sustainable land management are required at all levels. The data would include those establishing different values, including the valuation of environmental services and natural resources and their contribution to global, regional, sub-regional, national and county economies. The same data and information would inform National Land Commission and county governments while formulating prescriptions and guidelines and regulations on the type of land that is suitable for a particular area or landscape.
4. There is an urgent need for Kenya Bureau of Standards (KBS) to include missing natural resources data in national accounts, including full economic value of natural resources, natural resource accounting, accounting for environmental services and contribution of natural resources to national and subsistence economies. This in turn will require dedicated personnel or champions in

institutions for collecting the relevant data. The champions could also form a national task force to collate the data before passing it on to KBS.

Livelihoods

5. For diversification of livelihoods, increasing incomes of communities, reducing over-exploitation of few/limited resources and increasing the value of landscapes, there is a need to enhance targeted and demand driven research in identifying new unexploited economically viable natural products.

Institutional Arrangements

6. To reduce the negative impacts of often conflicting mandates of institutions, to enhance their coordination and to improve impact of the scarce resources, there is an urgent need to develop a cross-sectoral strategic framework with national sustainable land management outcomes and targets. Thereafter all sustainable land management initiatives of all institutions would contribute to one or several of the national level outcomes of the strategic framework.

Capacity Building

7. There is an urgent need to develop specialized human capacity. The economic dimensions of natural resources, including valuation, environmental economics and costs of externalities of various types of land uses, require human capacity. The same gap exists in collecting information and use of modern tools like remote sensing, GIS, and modelling, which are vital in making sustainable land management decisions.

Finance

8. Government, private sector and development partners need to increase financial resources for environment sustainability and management of natural resources, including new innovative sources of funds such as payment for environmental services, environment taxes and levies and user pay principles.
9. The private sector is increasingly becoming a potentially significant positive player in natural resource management and there is a need for local communities and county governments to partner with the private sector in such areas as ecotourism and development and up scaling of natural products based industries. There are opportunities under ELD Initiative for inter-phases and partnerships with private sector; these include empowering small farm holders through training in better land management, awareness of impacts of agrochemical and fertilizers, sharing results of studies, impacts of projects and data and measurement of types of values. There are also potential partnership opportunities in learning platforms targeting private sector, formulation of joint messages with private sector, co-designing projects and use of mechanisms such as EIA.

Emerging Issues

10. The new devolved governance structure offers opportunities to engage resource users more directly. However, this will in turn require affirmative support to the county governments to build their capacity, particularly in areas related to diversifying livelihoods and income sources.
11. Large quantities of oil, gas and coals deposits have been found in Kenya over the last few years. Their extraction has potential to contribute to economic development and growth. However, there are risks such as environmental degradation and conflicts over ownership and sharing of benefits. Kenya urgently needs to develop governance, legal and institutional frameworks to ensure that extraction operations do not degrade the environment and natural resources. In addition, the framework should incorporate guidelines on how to work with the private sector to put in place environmental and social safeguards.

7. Key Messages to the ELD Initiative

- Because of its dependency on natural resources, Kenya would always welcome new methodologies, provided they are in line with national policies, significantly improve management of the resources and result in increased benefits from and values of the resources. As mentioned above, the ELD Initiative can be adopted as an innovative tool to achieve the goals, objectives and principles of many national policies related to natural resources. The key issue is to convince the Kenya national and county governments that the methodology has value and actually makes a difference.
- As is often the case with new approaches, there will be some lag time in the adoption and use of the ELD Initiative methodology, which would be significantly reduced if it could bring on board additional financial and technical resources and assist Kenya to meet its global environmental obligations and commitments.
- The level of awareness of the ELD Initiative and the difference it makes when compared to other methodologies that are currently in use would also determine its uptake. What are the methodology's comparative advantages when compared to other economic and sustainable land management approaches and tools for sustainable land management?
- In Kenya today, the valuing of land, resources and environment services and establishing costs of natural resource degradation in Kenya, together with past and required investments for sustainable land management, has major gaps and barriers. These include collecting and collating data, date use and sharing protocols, inadequate finance and human capacity among others. The ELD Initiative can play a role in this area by supporting resource mobilisation and securing advanced training opportunities within ELD Initiative partnerships.
- Kenya has been very poor in terms of costing of externalities of policies, programmes, economic investments, and land use initiatives and projects and programmes beyond EIA and Environment Audits.
- Currently, the land owner in Kenya has authority to decide how land in used. Most land owners do not have sufficient knowledge of the value of land beyond the

contemporary use, irrespective of the impacts of the use on the land. Often, land use for short-term interests is more common than long-term interests. The ELD Initiative can play a catalytic role in establishing total values of natural resources and values of contemporary land uses together with positive and negative values and impacts of their uses.

- Kenya has a ready private sector in natural resources based economic sectors such as tourism, agriculture, agro-based industries and natural products. Currently their role is rather peripheral. The ELD Initiative can play a role in mainstreaming the roles of the private sector in promoting sustainable land management.
- As noted in Section 3.3 above, Kenya has a challenge of an inadequate national level coordinating institutional framework. The ELD Initiative methodology has a potential to have "total value" from different institutions as the uniting sustainable land management baseline.
- Capacity building for sustainable land management is key, including its adoption as a particular niche in natural resource conservation and management and putting together a team of dedicated professionals, including women, to champion the ELD Initiative aims.

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Annex I

Policies Related to Land Degradation and Sustainable Land Management in Kenya

Vision 2030, the national long-term development blue-print recognizes the importance of a secure environment through targeted programmes. The Ministry of State for Development of Northern Kenya and Other Arid Lands, in 2012 developed the **National Policy for the Sustainable Development of Northern Kenya and other Arid Lands** to fast track development and to ensure management of natural resources are reconciled with the realities of people's lives.

Draft Environment Policy; National Environment Policy (2012) - aims to provide a holistic framework to guide the management of the environment and natural resources. It further ensures that the linkage between the environment and poverty reduction is integrated in processes and institutions in order to facilitate and realize sustainable development at all levels.

Sessional Paper No. 6 of 1999 on Environment and Development covers the broad scope on environment and records concerns for environmental planning and economic issues. It underscores the importance of land as the primary resource for all human activities, and notes that present land use practices disregard land potentials, carrying capacities and limitations of land resources. **The Environment Management Coordination Act (1999)** ensures and regulates sustainable environmental management and maintenance of the capacity of the natural resource base. **The National Land Policy 2007** aims to secure rights over land, maintenance of quality of land for sustainable growth, investment and the reduction of poverty. **The National Agricultural Extension Policy (NAEP) of 2001**, to guide and harmonize management and delivery of extension service in the country. **National Agricultural Sector Extension Policy 2012 –** provides guidelines on addressing and devising funding modalities, packaging of technologies, technical capacity building and research–extension–farmer linkages. **Strategy for Revitalising Agriculture (2004-2014)** recognises that ASALs are not fully and effectively utilized due to among others, low productivity, poor infrastructure for marketing of livestock and delivery of services, insecurity and underdevelopment of industrial capacity. The policy outlines measures that include improving and developing genetic or breed of non-traditional livestock and animal species such as camel, ostrich and other wildlife through game cropping and sanctuary operation. National **Land Reclamation Policy 2012** - focuses on the protection, management and restoration of degraded lands and adoption of sustainable and integrated approaches to land use systems while also addressing threats to land resources such as: -declining soil fertility; diminishing agricultural lands; loss wildlife habitats; land degrading mining practices, deforestation, among others. **National Vision and Strategy (2005-2015) for ASALs** emphasizes natural resources management. This Vision & Strategy was based on the **National ASALs Policy** that had been developed in 2004 with a focus on coordinated, efficient and effective utilization of natural resource through community capacity building, participatory planning and decision making. **National Policy for the Sustainable Development of Arid and Semi-arid Lands of Kenya (2008)** aims to fast tracking sustainable

development by increasing investment and ensuring that the use of resources is reconciled with the realities of human lives. **The National Wildlife Policy 2011** provides a framework for conserving and sustainably using diversity of species, habitats and ecosystems for the wellbeing and benefit of the citizenry. The guiding principles of the policy include: participatory approaches that recognize rights of land owners and communities; recognizing wildlife as a land use option; integrated ecosystem and landscape approach and ensuring that benefits accruing from wildlife will be shared equitably among stakeholders. **National Forest Policy (2014)** proposes a broad range of measures and action to respond to the challenges faced by the forest sector and introduces a number of strategic initiatives to improve and develop the forest resource base including accountability and equity covers sustainable production and supply of forest products including timber, wood fuel, charcoal and other non-wood products.

The **Water Sector Strategic Plan (2010 - 2015)** recognizes the rapid deterioration of the environment with the destruction of water catchments due to deforestation, land degradation and erosion while the **National Water Policy of 2012** covers progressive restoration and protection of ecological systems. The **National Climate Change Response Strategy (2010)** policy acknowledges the reality of climate change in Kenya and proposes adaptation strategies to enhance the country's response and resilient to climate change. **The Sessional Paper No. 3 of 2009 on National Land Policy** commits the government to managing land for sustainable growth and development. The paper addresses land management problems and proposes ways to realize efficient and sustainable utilization and management of land and land based resources including restoration of the environmental integrity of land and sustainable management of land based resources.

Annex II

Compendium of Some Key Institutions Working in Land Degradation and Sustainable Land Management Kenya

Government State Departments and Parastatals	
Ministry of Environment, Water and Natural Resources	Policy formulation, analysis and review, coordination of sustainable land management activities, implementation of projects and programmes on sustainable management of natural resources, development of data and development, political support, advocacy and fulfilling international obligations.
Ministry of Agriculture, Livestock and Fisheries	
Ministry of Devolution and National Planning	
Ministry of Lands	
Kenya Wildlife Service	Conserve, protects develop and sustainably manage forest, wildlife within and outside protected areas and allied for environmental sustainability and economic development. The institutions also implement projects and programmes related to sustainable land management.
Kenya Forest Service	
Kenya Forestry Research Institute	Research in forestry and allied natural resources and to provide information for sustainable management of forests, forest landscapes, and natural resources
Kenya Agriculture Research Institute	Research programmes in agriculture, livestock and range management, sustainable land management. Contributing to innovations towards improved livelihoods through increasing productivity. KARI addresses and realizes its mandate through research and appropriate technology development towards integrated ecosystem management, grazing management and conservation of plant genetic resources.
Department of Resource Surveys and Remote Sensing	Collection of geophysical data on most natural resources with a view to monitoring changes over space and time. The data informs sustainable land management policy formulation planning, conservation and sustainable management of natural resources to a wide range of stakeholders.
NEMA	Coordinating environment management undertaken by all other government agencies, developing and enforcing environmental regulations, guidelines and standards and advising government on sustainable land management related sub-regional, regional and global conventions and treaties to which Kenya is party to.
Academic Institutions	
University of Nairobi	Building human resource capacity needed to address sustainable land management, undertaking demand driven, high quality inter-disciplinary and action oriented research. Extension service and consultancy on sustainable land management issues and rational utilization of natural resources.
Kenyatta University	
Jomo Kenyatta University of Agriculture and Technology	
Laikipia University	
National Drought Management Authority	Providing leadership and coordination on all matters relating to drought management by establishing mechanisms which ensure that drought does not result in emergencies and that the impacts of climate change are sufficiently mitigated. Implementing community level adaptation and resilience building project

	including
Diverse Array of CBOs	As site and grass-root partners, identification, formulation and implementation of sustainable land management initiatives including participatory monitoring and evaluation.
NGOs	
Laikipia Wildlife Forum	Engaging land owners and land users conservation and management of wildlife outside protected areas by maintaining ecosystem integrity and establishment of community projects within wildlife dispersal areas.
ACC	Conservation of biological resources by forging partnerships to identify and develop the scientific, economic, social and management skills for conservation and capacity building to conserve wildlife through sound science, local initiatives and good governance.
East African Wildlife Society	Advocacy and promotion of conservation activities, and facilitation of field projects. Promoting formulation of sound policies and laws and engaging at national and local level against poor decision and policies.
Nature Kenya	Implementing of conservation and sustainable land management projects together with promoting conservation of nature and encouraging community participation through promotion of sustainable benefits.
Ecotourism Kenya	Provides support for the development of ecotourism through community mobilization, and implementation of community based, owned and/or managed enterprises.
International Non- Governmental Organizations	
World Agro-forestry Centre (ICRAF)	Working in agricultural landscapes that experience the greatest environmental stress to balance improved productivity with the sustainable management of natural resources and examining institutional and policy innovations to sustain biodiversity at the interface between smallholder agricultural landscapes and conservation areas.
ICIPE	Research that aims improving livelihoods and developing alternative and environmentally friendly innovations to address low agricultural productivity and degradation of the natural resources. Use of combination of natural landscapes and of commercial insects to diversify livelihoods and to generate income.
WWF	Stopping the land degradation of and building a future in which humans live in harmony with nature, by promoting community participation particularly for forests and surrounding areas, conserving biological diversity; ensuring that the use of renewable natural resources is sustainable; and landscape level integrated plans.
International Development Research Centre (IDRC)	Promoting new strategies to facilitate large-scale adoption of resilient farming practices among resource-

	poor communities and increasing agricultural productivity while ensuring environmental sustainability and long-term economic development that benefits the communities.
World Vision	Environment enhancing development, agroforestry and conservation farming
Bilateral Development Partners	
USAID - Kenya	Environment and natural resource management program that supports sustainable growth in tourism, forestry and agriculture, that aim to increase productivity and adoption of sustainable methods with emphasis on ecological sustainability
JICA	Enhancing community resilience against drought in northern Kenya, forest conservation based on the assistance policy and discussion amongst the international community. Forestry coverage, development of drought tolerant trees for adaptation to climate change in drylands of Kenya, improve capacity for environmental management in the area where natural environment has been affected development.
DANIDA	Natural Resources Management Programme implemented by the government with the focus of reduction of poverty through sustainable management of natural resources and supporting appropriate policy and legal frameworks for the management of natural resources as well as strengthening local governance capacities.
United Nations Agencies	
UNDP	Implemented through partnerships with the government and local communities; sustainable land management protected areas management, small grants for protection of the natural resources while improving livelihoods. Advocacy, policy advice, technical support in formulation of policies, strategies together with formulation and implementation of projects and mainstreaming of sustainable land management in national development frameworks. Catalytic funding of sustainable land management initiatives.

Annex III

A Review of Past Studies on Value of Kenya's Natural Resources and Economic

UNEP (2009), "Kenya: Atlas of Our Changing Environment." Division of Early Warning and Assessment (DEWA) United Nations Environment Programme (UNEP). Nairobi, Kenya.

The Atlas provides visual and compelling evidence of the rapid changes taking place in the country's critical ecosystems due to pressures from human activities. The side-by-side displays of historical and current remote-sensing images highlight forest degradation, wetland drainage, and shrinking lakes to the impacts of refugees on fragile ecosystems and signs of coastal degradation. The Atlas provides a good evidence base for strategic intervention by the government and communities. The Atlas is thus an important resource for setting the context and establishing a baseline for the realization of Kenya's Vision 2030. Among the ways it does this are the following: discussing the contribution of key natural resources to the achievement of Vision 2030 by describing the inter-linkages between major socio-economic activities and the link between land productivity and forests, which regulate the micro-climates that make farming possible. The Atlas also focuses on Kenya's progress towards achieving Millennium Development Goal 7, which aims to ensure environmental sustainability, it provides an opportunity for the country to re-examine practical strategies for making rapid progress towards achieving this goal. It can do this by addressing salient environmental challenges explored in the Atlas, such as protecting water sources from point-source pollution and conserving water catchments, among others.

United Nations Environment Program (UNEP), 2012. The Role and Contribution of Montane Forests and Related Ecosystem Services to the Kenya Economy. UNEP, Nairobi, Kenya

The report elucidates that afforestation deprived Kenya's economy of 5.8 billion shillings ($US 68 million) in 2010 and 6.6 billion shillings in 2009, far outstripping the roughly 1.3 billion shillings injected from forestry and logging each year and the contribution of forests is undervalued by 2.5 per cent, putting the estimate of its annual contribution to Gross Domestic Product (GDP) at around 3.6 per cent. The main reasons for deforestation (largely driven by private consumption, and he demand of households) are multiple and complex: from unregulated charcoal production, logging of indigenous trees, marijuana cultivation, and cultivated fields in the indigenous forest to shamba-system practices, livestock grazing, quarry landslides and human settlements. While forest products bring in one-off cash to the national economy, they encourage illegal deforestation activities and create huge economic damage through the loss of regulating services.

The report also quantified negative economic consequences of deforestation including largely been driven by private consumption, as the demand of households. It promotes a fully functioning national forest resource account in order to capture the various benefits provided by forests.

Nkonya et. al. (2006), Out of site out of mind: Quantifying the long-term off-site economic impacts of land degradation in Kenya. Selected paper prepared for presentation at the American Agricultural Economics Association Annual Meeting, Long Beach, California.

The study investigated the returns to sustainable land management practices with an objective of finding practices that will reduce the on-farm and off-farm negative effects of land degradation. The Net Present Value of sustainable land management was found to be much greater than zero indicating sustainable land management practices are profitable when they are complimentary. The study also showed that for Payment of Environmental Services to be sustained it needs to be win-win i.e. increases returns from sustainable land management practices and also helps communities to minimize off-site effects of land degradation.

GOK, UNDP & UNEP (2013) "Economic Assessment of Kenya's Environment and Natural Resources" A draft report under the Poverty Environment Initiative.

The report highlights and discusses the critical role of sustainable exploitation and management of natural resources and environment in economic development and poverty reduction, together with bettering the livelihoods of all Kenyans. It begins by laying the constitutional, policy and development context of environment and natural resources management in Kenya. The report captures the contribution of natural resources and the environment to the national economy and general livelihoods support opportunities. It further demonstrates economic costs of unsustainable utilization of natural resources and management of the environment that are too often ignored.

The report presents detailed economic analysis that was undertaken on Kenya's environment and natural resources sector for purposes of providing evidence-base to inform policies on sustainable exploitation and management of natural resources and environment. The report demonstrates the risks of a "business as usual" approach to exploitation and management of natural resources and environment, and presents a case for more sustainable approaches to exploitation and management in the country that are backed by case studies.

Annex 2: Land subdivision and degradation in Narok, Kenya (Gicheru et al., 2012, In "Land Use Policies for Sustainable Development")

9. Land subdivision and degradation in Narok, Kenya

Patrick Gicheru, Stella Nabwile Makokha, Le Chen, Louis N. Gachimbi and Jane W. Wamuongo

PROBLEM DESCRIPTION

A large part of Kenya, over 80 per cent of the total land surface, is classified as 'arid and semi-arid land (ASAL); only 20 per cent of the country has high potential for agriculture and this carries 80 per cent of the population. The majority of the population in the Arid and Semi Arid Lands (ASALs) is agro-pastoral, combining small-scale farming with livestock keeping, while about 4 million Kenyans, mainly Maasai people, are engaged in full-time pastoralism. There is an ongoing trend of changing the traditional pastoral type of life to a sedentary life form, a process which is associated with various socio-economic and environmental problems. This situation is typical not only in Kenya, but across the whole Sahel belt in Africa (Sindiga, 1984). The physical appearance of Kenya's marginal semi-arid lands shows evidence of eroding hillsides, denuded plains, large erosion shelves, and deep sheer-sided gulleys; surface soil degradation and erosion in these areas are chronic (Sindiga, 1984). Moreover, plant production is limited by lack of available water and nutrients (Government of Kenya, 2004). Land degradation leading to desertification causes serious environmental and socio-economic problems in Kenya.

This case focuses on Narok District, and on the problem of land degradation and land use conflicts linked to land fragmentation and a changing land tenure situation. People have migrated to Narok from the surrounding highlands, causing land scarcity and related land use conflicts. The increasing land scarcity is associated with soil fertility depletion and soil erosion (Pingali, 1989). Previously there existed large rangelands and group ranges used by agro-pastoralists, pastoralists and wildlife, but much of this land (80 per cent) has during the last two decades been divided into individual land holdings. The conversion in land tenure has had

far-reaching environmental and socio-economic implications, in particular on the pastoralist, as the smaller units and parcels cannot sustain the pastoral life form (Kimani and Pickard, 1998). On the environmental side, this subdivision of land has caused a decline in pastoral land and overgrazing. Loss of land cover (grass, bushes and trees) has further reduced pasture availability for livestock, and has exposed the soil to erosion, while water catchment areas have been reduced. Increased soil erosion has reduced nutrient availability to crops and pasture, while runoff from arable farming has polluted the water used for both livestock and human consumption. The Mara reserve[1] located within Narok District is continuously experiencing deforestation and agricultural encroachment, though this reserve provides important revenue to the tourism industry, through which Kenya earns about USD0.8 billion annually. This subdivision of land has caused land use conflicts, not only between farmers and pastoralists, but also between wildlife and the local population (Otuoma et al., 2009). The consequence has been reduced crop and livestock productivity, resulting in conflicts and low economic growth.

THE CONTEXT OF THE PROBLEM

Historical Context

The Narok District is mainly occupied by the indigenous Maasai people, who are to a large extent nomadic pastoralists. The nomadic lifestyle implies a culture whereby land is treated as communal property, while livestock is considered as individual or family wealth (Amman and Duraiappah, 2004). Other people in the district are immigrants from the Kenyan highlands practising commercial agriculture. People have immigrated to these areas since the 1960s, and in parallel with this demographic change there have been a series of land reforms, changing the customary land tenure system with the objective of providing individual land titles (Gachimbi et al., 2007). In this customary land tenure system the level of rights of use and/or control over the land by the individual members of a family, including that of women, are set by customary norms and regulations. Land in this system is not seen as a commodity in an economic sense, and relations to land are chiefly governed by customs and taboos, though succession and inheritance rights remain problematic. The customary land tenure holders lost most of their land, as part of the Land Privatization Policy, to individual or private registered landowners who practise agriculture; agriculture then expanded into areas previously used for grazing and as wildlife dispersal zones (Aggarwal and Thouless, 2009). However,

while land is not seen as a commodity in the traditional pastoralist way of living, access to water and pastures is the essence of any pastoral existence. Hence, the land tenure issue in the pastoral communities is of paramount importance; no issue is more critical to the future wellbeing of Kenya's pastoral populations than secure land tenure (Little, 1984).

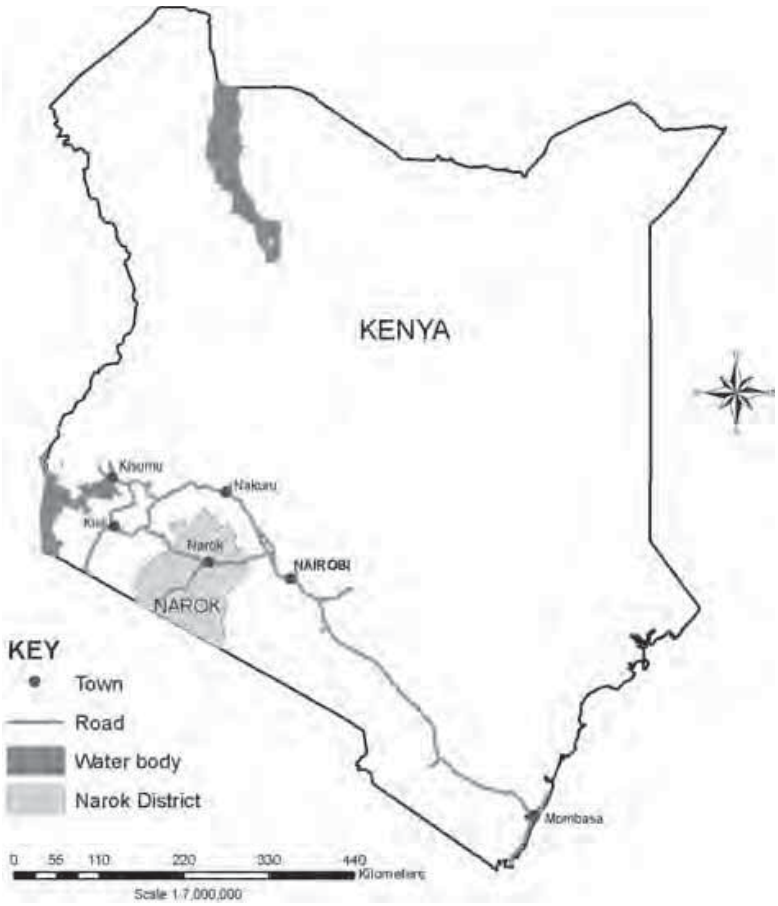
Sedentarization and urbanization continue to expand from the centre, and pastoral grazing lands are increasingly compressed. About 40 000 hectares of wet season wildlife and livestock pasture land have been lost to agriculture since 1975 within the Mara ecosystem.

The human population in the Narok District increased tenfold between 1962 and 1989, with the percentage of the non-Masaai increasing from 5 per cent to 53 per cent, population density increasing from 7 to 27 persons/ km^2, while land area per capita decreased from 0.15 to 0.03/km^2.

Environmental Context

The Narok District (Figure 9.1) covers an area of 15 088 km^2. It is situated in the south-western part of the country and borders Tanzania in the south; Transmara to the west; Bomet, Bureti and Nakuru to the north; and Kajiado to the east. The altitude ranges from 1000 metres to 3098 metres above sea level, and plains cover most of the area that lies between 1500 and 2100 metres altitude. Topographically the district has highlands in the north, in the west, and in the south-east. Narok falls under two drainage systems, the Rift Valley system, and the Lake Victoria drainage system in the north-west. The Rift Valley system is characterized by internal drainage and generally has scarce surface and underground water. The Mara is the main river in the district, followed by Ewaso Nyiro. All other tributaries, except the Enkare Narok and Enkare Siyapei tributaries, are seasonal, drying up during the dry season.

The two rivers and the perennial tributaries comprise the most dependable surface water resource for the district's water requirements. Rainfall is an important climate variable as it determines the potential for vegetation cover, and for agricultural production. The vegetation cover is related to increasing precipitation and decreasing temperature from the plains towards the highlands (Ogutu, 1996). The soils of Narok District are diverse due to topographic, climatic and geological differences, and soil types include brown loams and red friable clays in the highlands, and red friable clays and sandy loams in the plains (Ogutu, 1999). The ecosystem has a rich biodiversity. The Great Migration[2] is one of the most impressive natural events worldwide, involving an immense number of herbivores: some 1 300 000 wildebeest, 360 000 Thomson's gazelle, and 191 000 Zebra make up this great spectacle. Besides this, all members of the 'Big Five' are



Source: Kenya Soil Survey (2011)

Figure 9.1 Location of Narok District in Kenya

found in the Maasai Mara and make game viewing a phenomenal experience. Over 450 species have been identified in the Maasai Mara ecosystem with a high diversity of trees, shrubs, flowers and grasses. However, forest destruction in the district has been on the increase, with forest cover falling from 16 per cent to about 1.7 per cent of the total land area, thus falling below the acceptable limit of 2 per cent.

Socio-economic Context

The major livelihood activities in Narok, and their respective populations, are as follows: mixed farming (280 578 people), agro-pastoral (40 023), pastoral (109 783), and trading/business (30 411). The pastoralists comprise about 70 per cent of the population and occupy about 1.6 M ha, while the small-scale immigrant farmers, about 30 per cent of the population, occupy about 0.2 M ha. These immigrant farmers grow food crops

mainly for subsistence. The large-scale commercial farmers are relatively few. Agriculture contributes an average of 90 per cent of the household income, and a total of 69 680 households work in the livestock industry. Other sources of economic revenue for the people include self-employment (1 per cent), wage employment (5.2 per cent), and urban employment (1.5 per cent); it is mainly people living in Narok town and its surroundings who are involved in trading and business activities.

The pastoralists and agro-pastoralists, in addition to rearing livestock, produce food crops such as potatoes, maize and vegetables mainly for subsistence. The large-scale commercial farmers are immigrants who either rent or buy parcels of land from group ranches from the Maasai people. Some of the large-scale agricultural farms are irrigated, using water from the Mara river. Wheat farming is the major cash crop, while maize, beans, potatoes and vegetables are the major food crops (District Agricultural Officer, personal communication). Pyrethrum and coffee are relatively neglected because of the poor market for these crops. Other products grown in the district are beans, Irish potatoes, tomatoes, finger millet, cassava, soy beans, cowpeas, pigeon peas, tobacco, sunflower and tea. Marketing of the crops has been mainly out of the district, mostly to Nairobi. Relatively few local people are employed in the farming industry, as commercial farming is relatively limited in the district and farms are highly mechanized. The commercial farms do not significantly contribute to the GDP of Narok District compared to other activities like wildlife and livestock production. Furthermore, the agricultural sector in Kenya has registered poor growth over the last decade (declining by 2.4 per cent in the year 2000 and growing only 0.7 per cent in 2002). Agricultural marketing information and infrastructure are poorly organized and institutionalized. There are small and fragmented local markets, and exports are vulnerable to changes in demand for agricultural produce and non-trade barriers in foreign markets. There has been low investment in agriculture in the district compared to the other agricultural districts in the country, with no credits or subsidies extended to the farmers. Infrastructure has in general been poorly developed, constraining the district's access to markets in other parts of Kenya.

Tourism is the land use activity in the area that has been extremely successful in economic terms (PricewaterhouseCoopers, 2005) and the relative importance of tourism to Kenya's economy has risen steadily over the last 40 years. Tourism contributes roughly 35 per cent of the country's foreign exchange revenue, and a significant portion of this tourism is wildlife-based (Sindiga, 1995). The Maasai Mara Reserve has received more visitors than any other protected area, including inland and marine national parks and reserves, in Kenya and East Africa (Sindiga, 1995). The income from tourism and wildlife activities does not, however, benefit the farmers

directly, and revenues from the visitors often do not reach the community on behalf of whom the Narok County Council manages the Mara. At the same time, the large numbers of tourists visiting the Mara are said to have the unintended consequence of degrading the wildlife habitat.

Poverty is perhaps the single most important problem for many people in the district. Approximately 64 per cent of the district's total population lives below the poverty line, and the illiteracy level is high. A majority, 70 per cent, of the poor are women without significant sources of income. Women provide over 80 per cent of domestic food requirements in the rural areas, yet their access and control over land are increasingly being jeopardized. The majority of the people depend on water from boreholes and water pans, both for the household and their livestock.

Institutional and Policy Context

Environmental conservation is carried out in collaboration with the land development and management division of the Ministry of Agriculture, which is involved in coordination and implementation of conservation activities; the National Environment Management Authority (NEMA) is involved in regulation and coordination of environmental issues; the forest department – all forestry activities; the World Wildlife Fund – conservation of Mara river basin; the Ewaso Nyiro South Development Authority (ENSDA) – Ewaso Nyiro river catchment protection. The collaborative activities involve planning, community mobilization, capacity building, implementation and input provision through environmental district, divisional and location committees; while environmental conservation programmes include woodlot establishment, agro-forestry, drip irrigation, soil fertility improvement technology, roof water harvesting and ox plough technology. Land management is regulated by numerous statutes and policies implemented by different sectors of the government. There is a lack of coherence in land use policy and formal institutional arrangements which leads to lack of coordination in the implementation of sound land use and management strategies. Land ownership in Narok is mainly trust land; however, there are also freehold, communal, family ranches, or group ranches. Rangelands are largely used as group ranches or national parks but with an increasing trend towards subdivision of ranches into individual holdings. A case in point is Suswa group ranch, which has been divided into individual land holdings of 12 hectares with freehold titles. Other land is owned by the group ranches under the Land (Group Representatives) Act. The group ranches concept originated from the East African Royal Commission, which recommended that the tribal lifestyle of the herding communities be protected. However, the

government later converted group ranches to individual titles. This has had far-reaching tenure and environmental implications for social and economic life, and led to subdivision of land into units and parcels that cannot sustain the prevalent land uses.

There are many policies that influence land use in Narok District, of which the most important ones may be briefly listed. The policy, *Strategy for Revitalizing Agriculture (SRA), 2004–2014* is a national policy whose vision is 'To transform Kenya's agriculture into a profitable, commercially oriented and internationally and regionally competitive economic activity that provides high quality gainful employment to Kenyans'. The objective of this policy is to strengthen the agricultural sector by addressing the various constraints that affect its productivity. Through this policy, constraints relevant to Narok, including low soil fertility, pests and diseases, drought and floods, low quality inputs and poor markets, are addressed. The *National Policy for Sustainable Development of Arid and Semi-Arid Lands in Kenya*, which will soon be implemented, has the objective to enhance food security, increase living standards and reduce dependency on food aid by the population living in the ASALs. This policy is formulated in order to provide a framework for a coherent approach to ASAL development that is informed by a new understanding of the different livelihood systems and causes of poverty in these areas. The policy identifies critical areas and sectors where investment will immediately stimulate economic growth and capital/asset accumulation, such that wealth is created, and poverty and long-term vulnerability to insecurity and disasters are significantly reduced over the next 10–15 years in the ASALs.

The current *Water Policy* (Sessional paper No. 1 of 1999) provides an integrated framework for water provision for improving the social well-being of the population, enhancing economic performance and for ecosystem conservation. Objectives of the policy include preserving, conserving and protecting available water resources, supplying water of good quality and sufficient quantity; and establishing an institutional framework for management, supply and sanitation development. Two other policies, the *Land Privatisation Policies* and the *Wildlife and Tourism Policies*, which are identified as drivers in this case study, are described in the 'Policies as drivers' sub-section below.

CAUSAL CHAIN ANALYSIS

The analysis that follows is based on the Driver, Pressure, State, Impact, Response (DPSIR) framework (Figure 9.2) which provides a good basis to identify the relevant causal chains (see also Chapter 4).

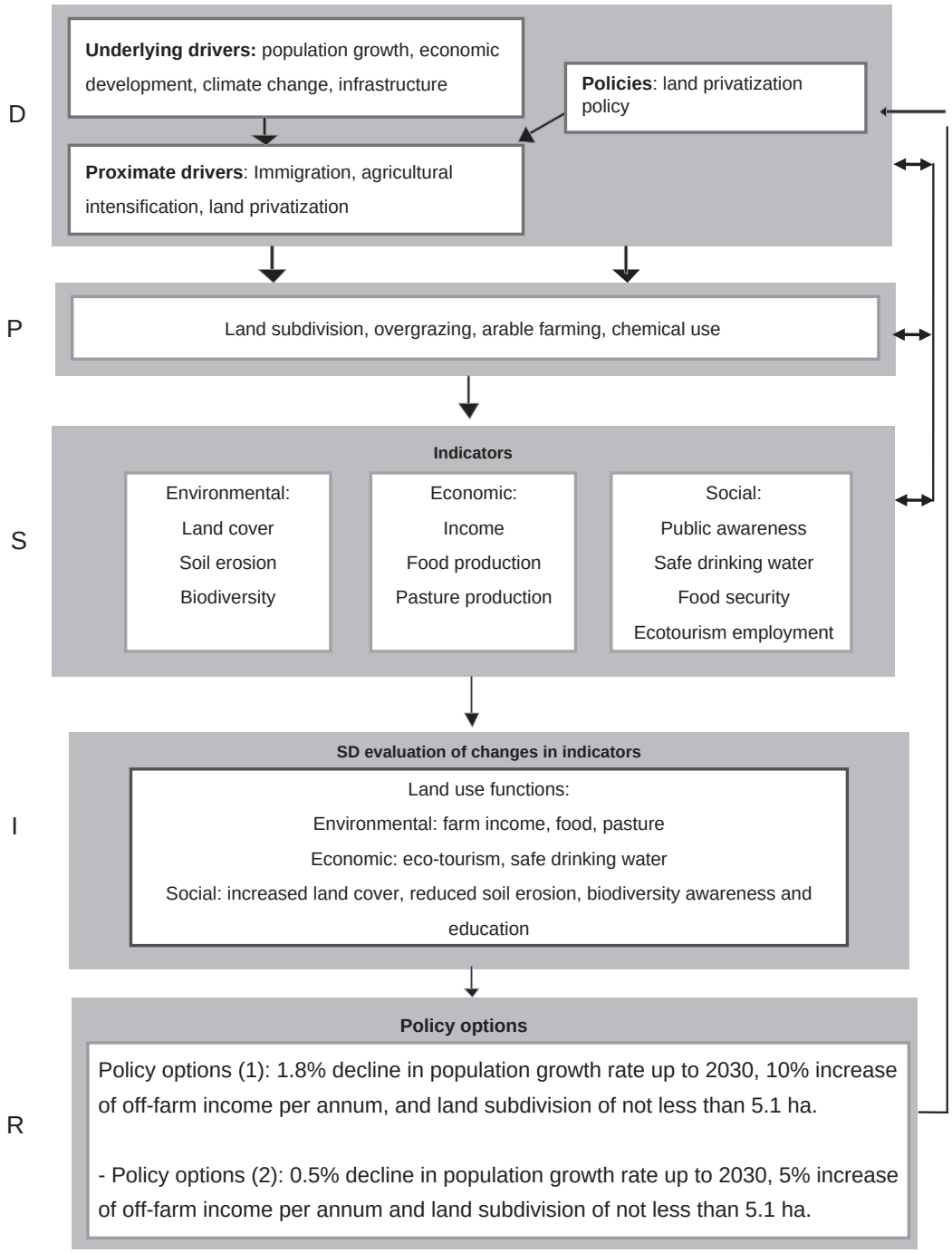


Figure 9.2 DPSIR framework of the case study in Kenya

Drivers

The main underlying drivers include; economic development, road infrastructure, natural population growth and climate change.

Economic development is a major underlying driver, whether related to the high potential, relatively fertile areas within Narok, including the forest area of the Mau, or the tourism activity within the Mara national park. In the last few years, the general road infrastructure, and in particular the improvement of the main road from Nairobi to Narok, has provided for improved income from tourism and from a diversified agriculture. Natural population growth is one important factor for the population increase in the area. The underlying driver climate change reduces overall precipitation and increases its variability, affecting land cover and agricultural productivity. Narok District is prone to climatic shocks and in particular droughts.

The main proximate drivers in the area are immigration and agricultural intensification. Farmers have migrated to the dry lands from the high lands due to lack of available land. This influx of people has brought about changes in land use, in subsistence practices and in lifestyles. The population densities are expected to increase according to the same trend over the next ten years. The high population densities in certain areas within the district are attributed to relatively more favourable weather conditions, and fertile soils that support agricultural activities. The movement from forest and bush fallow systems of cultivation to annual and multi-crop cultivation systems is called agricultural intensification (Pingali, 1989). Along with the new land tenure system, there has been a desire to own land individually among the traditional Maasai. Group ranches, which initially were owned by clans, have been subdivided and units have been sold or leased to immigrants. This subdivision has led to land conversion from the original land use of keeping animals to agricultural production using fertilizers, herbicides and other pesticides, intensifying land use. Unfortunately few land conservation measures, such as terracing and fallowing, have been provided.

Policies as Drivers

The Land Privatization Policy has changed the land tenure system to private ownership through the Registration of Titles Act (Cap. 281), Cap. 3 of 1963 (revised 1989). Under the private tenure system (individual or cooperative), the Land Privatization Policy encourages land subdivision, registration and privatization, irrespective of whether land is agriculturally productive or marginal (ASAL areas) to give confidence and incentives to landowners and managers so that they are able to devote their time and capital to land improvement practices and reap the benefits thereof. This subdivision has attracted immigrants from outside the district who are leasing land from the current individual pastoralist landowners. Some pastoralist landowners also sell land parcels to immigrant farmers. This worked well while population pressure was still low but is now leading to land fragmentation below

economically viable units, leading to reduced land productivity, nutrient losses through erosion, land conflicts, reduced crop rotation and so on.

Under the constitution *Trust Land Act*, County Councils were supposed to hold trust land on trust for residents, but the council and the government have alienated most of the land to rich people (usually non-Maasai). As a result, the Maasai are gradually being pushed to more marginal areas. The resultant small plots cannot provide an adequate source of subsistence for the Maasai (Kimani and Pickard, 1998) and attempts by these people to continue rearing large numbers of livestock for subsistence on their small individual plots with limited mobility increases the potential for land degradation (Kimani and Pickard, 1998). The Land Privatization Policy, together with the Trust Land Act have led to agricultural expansion into areas previously used for grazing and as wildlife dispersal zones (Aggarwal and Thouless, 2009). Since 1975 about 40 000 hectares of wet season wildlife and livestock pasture land have been lost to agricultural production in the Mara ecosystem.

The main goal of *The Wildlife and Tourism Policy* is to direct greater economic benefits from parks to local people. To reach this objective, the Kenya government called for: (1) revenue sharing with landowners adjacent to the parks, and relevant local authorities; (2) direct compensation for loss and injury to people; and (3) community participation in wildlife management. However, these strategies are difficult to implement (Sindiga, 1995). Over the years, it has been observed that there is: (1) uneven distribution of revenue among stakeholders involved in wildlife tourism; (2) a lack of investment in wildlife by landowners; and (3) the denial of compensation for loss of life and damage to property (Sindiga, 1995; Norton-Griffiths, 2006). Numerous stakeholders are involved in wildlife tourism, among which are individual and group landowners (Sindiga, 1995). However, landowners have, in the main, been involved in wildlife tourism enterprises only as employees or as the recipients of limited revenue-sharing, ground rents or charges, rather than as full owners or entrepreneurs. The primary profits from wildlife tourism have tended to accrue to large commercial operators or to the state (Emerton, 1997). As a consequence, the expansion of human settlements threatens wildlife habitats. This has led to the menace of wildlife to livestock, crops and people. Not being compensated for their losses, communities adjacent to National Parks and National Reserves pay a price for the conservation of wildlife.

Pressure

The pressures in the case study area include: an increasing demand for arable land, subdivision of land, continuous cultivation, clearing of bush

and overstocking. High usage of inorganic agro-chemicals, especially by large-scale wheat farmers, is another pressure in the area.

State

Narok is characterized by reduced forest and vegetation cover, and reduced land for pasture. There are droughts and floods, increasing water and soil pollution, with lack of good quality water for human and livestock consumption. Human conflicts are prevalent due to scarce natural resources (water and pasture).

Impacts

During the last 30 years the Narok District has undergone rapid changes in terms of land use and land tenure, as land tenure has changed from free range land, to group ranches, and then to private ownership (Duraiappah et al., 2000; Reid et al., 2007). However, the conversion of group ranches to continuously smaller private land units has had far-reaching environmental implications on the social and economic lives of people, and especially the Maasai (Waiganjo and Ngugi, 2001). The smaller land units could not sustain the prevalent land uses and this has resulted in over-exploitation of the natural resources. Alongside, there has been a lack of understanding, by the pastoral society in particular, of the new land tenure institutions and market exchange, which has led to their exploitation and marginalization by better informed groups.

Overall there is poor economic growth in the area, a situation which has been attributed to falling agricultural productivity, drought and environmental degradation, among other factors. Despite this, there has been a slight general improvement of the economic status of people due to diversification of economic activities, and because of improved infrastructure. Tourism is the major contributor to GDP in the district, but due to waste disposal and poor management, the activity degrades the land and there are few benefits for the local population. Thus, while the economic situation has improved, most people are still poor and tend to over-utilize the available resources. Humans encroach on land traditionally used for livestock for farming, while increasing herd numbers are stressing available grazing resources, leaving land and soil in a degraded state. The country loses up to 12 million trees annually to charcoal alone, while there is on the other hand very little planting of trees. There has been loss of land cover, exposing the soil for erosion, and reducing soil nutrient availability to crops and pasture. In the Suswa Location of the district, for instance, between 1980 and 2007, the soil erosion rate increased from

50 per cent to almost 80 per cent, and water availability reduced from 90 per cent to about 55 per cent (Gachimbi et al., 2008). The consequence has been reduced crop and livestock productivity. Agricultural intensification and the use of inorganic agro-chemicals in wheat and horticultural production, in particular by large-scale farmers, have polluted the water bodies which are used for both livestock and human consumption. Environmental degradation is exacerbated by climate, causing drought and reduction in water catchment areas. People are increasingly facing water shortages as well as problems with poor water quality and environmental degradation.

The long-term trend shows a decline of more than 60 per cent in total wildlife density in the last 25 years. The legal ownership of wildlife by the state, both in protected areas and in private land, and the exclusion of local communities, have alienated wildlife and their benefits from the people, thereby sparking conflicts. The situation is made worse because of the failure of local, national and regional legislation and a lack of institutional structures to address water resource issues.

The destruction of the 'Mau forest complex' within the district may serve as a case example. Since the late 1970s, huge pieces of land have been excised from the country's forests, and the destruction of the forests is reported to have wide-ranging environmental impacts which are already starting to be felt, with prolonged drought and lower rainfall levels affecting farming conditions (Moody, 2008). Due to the destruction of the forest, some of the streams that once flowed from the rivers have now dried up. There is an ongoing proposal to relocate 2000 inhabitants into the Mau forest complex, an initiative which has raised a storm locally and in the Nile basin countries (Ngunjiri, 2010). The survival of the Maasai Mara and Serengeti game reserves depends on the Mau, and environmental experts are concerned that the biodiversity, and indeed the forests, will disappear if nothing is done to prevent forest destruction (UNEP, 2008). The costs of the destruction of the Mau in economic terms surpasses the USD300 million given by UNEP (UNEP, 2008). These concerns have prompted a collaboration between UNEP, EU and the Government of Kenya, which aims to restore the Mau forest complex (UNEP, 2011).

SUSTAINABLE DEVELOPMENT OBJECTIVES AND POLICIES

The district is well endowed with diverse natural resources, which, if well managed, could provide sustainable livelihoods for people in the district,

but environmental degradation is exacerbating the poverty situation. The goal of sustainable development is 'effective management for sustainable economic growth and poverty reduction' through introduction of high quality crops, the establishment of industries to process agricultural products and promote eco-tourism (Narok County Council, 2005).

Sustainable Development Objectives in Narok

The economic target is to increase the share of off-farm income from eco-tourism by 10 per cent per annum up to the year 2030 by involving more pastoralists in tourism. The 10 per cent increase is commensurate with the Government of Kenya's Vision 2030[3] of increasing the GDP growth rate of 10 per cent per annum (Government of Kenya, 2007).

The social target is to provide off-farm employment and to reduce the high dependence on the land. Income from employment will then contribute to the important targets of increasing food security and general welfare of the population.

The environmental target is to improve soil conservation measures, especially on leased large-scale farms, and to reduce use of pesticides.

Selected Policies to Promote Sustainable Development

The current policies do not adequately address the challenge of ecological sustainability. To achieve the economic, social and environmental targets just mentioned, it will be necessary to increase employment off-farm coming from the Wildlife and Tourism sector and to minimize land subdivision to uneconomical units by adapting new Land Privatization and Wildlife and Tourism sector policies.

An *Adapted Land Privatization Policy* would restrict land subdivision to no less than 5.1 ha per total livestock unit (TLU) (Jager et al., 1999). The purpose of this restriction is for land utilization to be viable in economic and environmental terms. In these semi-arid areas 5.1 ha is considered an economical land unit when under irrigation. The government has proposed a new land use policy (Government of Kenya, 2006), in which measures will be put in place to determine appropriate land sizes according to use and productivity of land, and provide incentives to stimulate voluntary readjustment of land sizes. Restricting land subdivision will reduce land cultivation for family food crops and hence reduce land degradation. Although this will not be easy, households with smaller land sizes will be encouraged to consolidate. Reduction of population growth rate by 1 per cent per year up to 2030 is envisaged to be necessary (Wortham, 1995) in order to attain the lower limit land size. Reduction in population growth

rate will reduce pressure on cultivation of the land, therefore reducing land degradation. In Kenya, programmes are in place to reduce the population growth rate.

There is a call for an *Alternative Wildlife and Tourism Policy* by stakeholders and researchers, which aims to encourage local participation in wildlife management in order to enhance the equal distribution of the tourism revenues. (Currently the employment of the local community is almost nil.) The policy will act by decentralizing the tourism authority and decision-making processes from the national level to democratically elected regional and local institutions and organizations (Akama, 1997). Local institutions will furthermore be given the task to educate and provide capacity-building to local people for off-farm employment in the tourism sector. An increase in the rate of employment will reduce local people's over-reliance on agriculture and pastoralism for their livelihood, thus reducing soil degradation and human–wildlife conflict.

INDICATOR DISCUSSION

Indicators are used to measure the impact of the chosen policies, Alternative Wildlife and Tourism Policy and the Adapted Land Privatization Policy, relative to the sustainable development targets of the Narok District. Different indicators of Land Use Functions (LUFs) were chosen to represent different dimensions of sustainable development (Table 9.1).

Environmental Dimension

The biotic and abiotic indicators measure land status related to impacts from the chosen policy to increased employment and the anticipated decline of the area under pasture. The indicators *soil runoff*, *water runoff* and *soil erosion* are selected to indicate whether the status of the soils have improved. The indicators *water quality*, *fertilizer use*, *pesticide use* and *soil nutrient balance* provide a direct measure of agricultural intensification activities. High erosion levels, and high fertilizer and pesticide use indicate reduced sustainable development. The biotic indicators *vegetation growth rate*, *total livestock units (TLU) per unit land*, *share of land under cultivation*, and *biodiversity* provide information of the pressure on the vegetation cover. The indicator *maintenance of ecosystem processes* is the share of land under natural vegetation, an indicator which measures the degree that ecosystem processes are maintained. A low level of remaining natural vegetation would indicate a very low effect of the selected polices for implementation.

Table 9.1 Indicators selected according to LUFs and SD dimension

Sustainable development pillar	Land use functions (LUF)	LUF Indicator
ENV 1	Provision of abiotic resources	Fertilizer use, water availability, rainfall/PPE, slope, soil type, average soil runoff, average water runoff, water quality, soil erosion, soil nutrient balance, pesticide use.
ENV 2	Provision of biotic resources	Growth rate of vegetation, share of land under cultivation, total livestock units (TLU) per unit land, biodiversity.
ENV 3	Maintenance of ecosystem processes	Share of land under natural vegetation.
ECO 1	Industry and services	Land market price, land lease price, price of labour
ECO 2	Land-based production	Crop type, rate of farmers using tractors to till, rate of income from tourism, share of off-farm income.
ECO 3	Provision of infrastructure	Access to agricultural extension office, access to services and markets, access to roads, access to dips for livestock.
SOC 1	Provision of work	Labour provision according to gender, share of population with membership in social group, population growth rate, share of population with 8 yrs of education.
SOC 2	Food security	Average staple food consumption per household/yr.

Economic Dimension

The indicators *land market price*, *land lease price* and *price of labour* provide information about the cost of production. It is anticipated/believed that low costs of production will stimulate conversion of natural land to agricultural land, while high production costs, high prices for land and labour may reduce the rate of land conversion. The indicators *rate of income from tourism* and *share of off-farm income* in the district are chosen to measure the degree of economic development in the area; This is a diversified economy in which the fact that an increasing part of the income is derived from secondary industry implies economic growth. Also, an increased rate of income from tourism can indicate more off-farm activities relative

to fewer pastoralist activities, less grazing pressure, reduced soil and vegetation loss. The indicator *access to agricultural extension office* indicates access to education and information on sustainable agricultural production and soil management practices, for increased profit.

Social Dimension

The indicators *share of population with membership in social group* and *share of population with eight years of education* are selected to measure the degree of access to knowledge on sustainable land use. Engagement in social groups increases the chance of getting information on sustainable land use. Education increases awareness on sustainable land management, therefore a high share of educated people increases the chance to have sustainable land management, thus reducing land degradation. The indicator *population growth rate* indicates the pressure for increased cultivation of land for food, while the indicator *average staple food consumption per household/year* reflects the relationships between food security and the resources available to the household. It is hypothesized that a household that is food secure is likely not to engage in activities that exploit the soil unsustainably.

CONCLUSIONS

Over 80 per cent of Kenya land area is classified as arid and semi-arid land. Only 20 per cent of the people live in these areas, but rapid population growth has led to increasing pressure on these marginal lands, threatening sustainable development. This case study focuses on the District of Narok, which exemplifies the problem, not only in Kenya, but across the whole Sahel belt, of land degradation and land use conflicts linked to land fragmentation and a changing land tenure situation. The change from a traditional pastoral to a sedentary life style is associated with a number of socio-economic and environmental problems.

The DPSIR analysis, supplemented by involvement of stakeholders, helped to reveal the complex interplay of causal factors in this case. In summary, a combination of economic forces and population growth – largely outside the study area – has led to greatly increased pressure on land. A wide range of different, but related land use policies have an impact on the region, and the policy typology has guided the understanding of the impact, or lack of impact, of these policies on the different dimensions of SD. These factors have been accompanied by changes in land tenure which have encouraged privatization. Previously there existed large rangelands and group ranges used by agro-pastoralists, pastoralists and wildlife,

but much of this land (80 per cent) has during the last two decades been divided into individual land holdings, increasingly small in size.

On the environmental side, this subdivision of land has caused a decline in pastoral land and overgrazing. Loss of land cover (grass, bushes and trees) has further reduced pasture availability for livestock, and exposed the soil to erosion, while water catchment areas have been reduced. Increased soil erosion has reduced nutrient availability to crops and pasture, while runoff from arable farming has polluted the water used for both livestock and human consumption. And as human populations grow and land use intensifies, the pressure on the remaining wildlife increases; there has been a decline of more than 60 per cent in total wildlife density in the last 25 years in Narok District.

These changes have economic implications in turn. Plant production is limited by lack of available water and nutrients, so that crop and livestock productivity is reduced. And the Mara game reserve, located within Narok District, which provides major revenue to Kenya's important tourism industry, is suffering deforestation and agricultural encroachment.

Associated with these impacts are social problems. The smaller land units cannot sustain the pastoral life form, and there are conflicts between different groups – especially the pastoralist Maasai and the sedentary population, largely recent migrants. The new institutions for land tenure, land use and market exchange are not well understood by some groups in the area, which has often led to their exploitation and marginalization by other groups who are better informed. The land use functions (LUFs) have provided a useful framework to structure the different impacts and to ensure that appropriate indicators are selected for the measurement of these impacts across the dimensions of SD.

Two policies have been particularly focused upon in this study. In brief, the land privatization policy has been a contributory factor to the problems here identified, while the policy on wildlife and tourism has been of only limited success in countering them.

NOTES

1. The Mara game reserve is located in south-western Kenya, and is effectively the northern continuation of the Serengeti National Park game reserve in Tanzania.
2. Great migration is the seasonal migration of wildebeest between Serengeti and Mara national parks.
3. The Kenya Vision 2030 aims at making Kenya a newly industrializing middle-income country providing high quality of life for all citizens by the year 2030. The vision was developed through a stakeholder consultative process involving Kenyans from all parts of the country.

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Annex 3: List of Participants, Narok Consultative Workshop

ECONOMICS FOR LAND DEGRADATION WORKSHOP - THE SEASONS HOTEL NAROK - 3RD APRIL, 2014			
	NAME	**ORGANISATION**	**SUB-COUNTY**
1	Agnes Kosua	Women Group Rep	Narok
2	Alice Mwongeli	NDMA	Narok
3	Anne Juepner	UNDP Drylands Development Centre	Nairobi
4	Barbara Ombasa	Sustainable Land Management Project	Nairobi
5	Benard Ouma	Sustainable Land Management Project	Nairobi
6	Catherine Kasima	Norbrook	Narok
7	Christopher Kunder	Livestock	Narok
8	Elizabeth Koila	Farmer Field School	Narok
9	Francis Kunyanga	Narok PTC	Narok
10	Gitta Kollner	Stockholm Environment Institute	Nairobi
11	Herickson Ngeno	Interior	Narok
12	Jamin Ruto	Sustainable Land Management Project	Narok
13	Johnson Lekayia Shayo	Farmer Field School	Narok
14	Josephine Mugambi	SNV	Narok
15	Joyce Kiunjuri	World Vision Kenya	Narok
16	Kassim Farah	County Commisioner	Narok
17	Kisetia Ole Parsampula	Farmer Field School	Narok
18	Kisinyinye Kumomoru	Women Group Rep	Narok
19	Marsella Soittara	Women Group Rep	Narok
20	Maurice Suji	Agriculture	Narok
21	Michael Otieno	Water	Narok
22	Moses Rotich	Forestry	Narok
23	Patrick Lekenit	NEMA	Narok
24	Paul Kerepei Saidimu	Farmer Field School	Narok
25	Paul Siele	Farmer Field School	Narok
26	Reagan Sakau	Commercial Farmer	Narok
27	Richard Taga	Farmer Field School	Narok
28	Simeon Narawkaile	Commercial Farmer	Narok
29	Solomon Nkurumuo	Commercial Farmer	Narok
30	Stacey Noel	Stockolm Environment Institute	Nairobi
31	Stephen Kisio	NCSHF	Narok
32	Zeinabu Khalif	Sustainable Land Management Project	Narok

Annex 4: Agenda, Narok Consultative Workshop

Time	Activity		Facilitator
8:45	*Arrival and registration of all participants.*		
09:00-09:30	***Introduction***		
09:00-9:30	Narok County Commissioner UNDP Drylands Development Centre	Workshop opening Participant Introductions Overview of workshop and outline of key objectives	Dr. Zeinabu Khalif
09:30-10:00	***Session 1: Introduction of the ELD initiative***		
09:30-10:00	Stacey Noel (ELD Policy WG)	Presentation of the ELD initiative *(15 mins)* followed by 15 minutes of questions and discussion	Dr. Zeinabu Khalif
10:00-10:45	***Session 2: Understanding the ELD initiative in the country context***		
10:00-10:30	County Government Officials : • SLM Focal Officer • ENSDA (Ewaso Nyiro South Development Authority)	Presentation of Key SLM issues in Narok County (15 Minutes each)	Christopher Kunder
10:45-10:45		Discussions	
10:45-11:15	• World Vision • SNV	Presentation of Key SLM issues in Narok County (15 Minutes each)	
11:15-11:30		Discussions	
11:30-11:45	Tea and coffee break/Group Photo		
11:45-13:30	***Session 3: Applicability of the ELD approach in Narok County – challenges and opportunities***		
11:45-12:15	Voices from county level SLM practitioners and stakeholders	*Verbal presentations (10 mins each)* • Women groups • Local small scale farmers/pastoralist • Local private sector • County Government	Christopher Kunder
12:15-12:30		Discussion	
12:30-13:30		Summary of key recommendations and action points	Dr. Zeinabu Khalif
13:30-15:00	Lunch		
15:00	*Departure of all participants*		

Annex 5: List of Participants, Nairobi Consultative Workshop

	Name	Organization	Email
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27	Kenneth Wanjama	MEW&WR	

Annex 6: Agenda, Nairobi Consultative Workshop

Time	Activity		Facilitator
08:45-09:00	*Arrival and registration of all participants.*		
09:00-09:30	***Introduction***		
09:00-09:10 09:10-09:20 09:20-09:30	Ministry of Environment, Water and Natural Resources UNDP Drylands Development Centre (UNDP-DDC)	Workshop opening and Welcoming Remarks Overview of workshop objectives and agenda; Introduction of participants	Facilitated by Zeinabu Khalif, UNDP Kenya Country Office
09:30-10:15	***Session 1: Introduction of the ELD initiative***		
09:30-10:15	Stacey Noel, ELD Policy Working Group, and Robert Costanza, The Australian National University	Presentation of the ELD initiative *(30 mins)* followed by 15 minutes of questions and discussion	
10:15-10:45	***Tea and coffee break***		
10:45-12:45	***Session 2: Understanding the ELD initiative in the country context***		Facilitated by Prof. Gachene, University of Nairobi
10:45-11:00	National Environment Management Authority (NEMA)	Presentation of Key SLM issues in Kenya	
11:00-11:45	KARI/Kenya Soil Survey, KEFRI	Presentation of ELD related work *(15 mins each)* followed by 15 minutes of questions and discussion	
11:45-12:45	Kenya Agricultural Productivity and SLM Project (KAPSLM) IUCN UNDP/UNEP: PEI Africa	Presentation of ELD related work *(15 mins each)* followed by 15 minutes of questions and discussion	
12:45-14:00	***Lunch***		
14:00-16:30	***Session 3: Applicability of the ELD approach in Kenya – challenges and opportunities***		Facilitated by Chris Gakahu, UNDP Consultant
14:00-14:10	Anne Juepner, UNDP-DDC	Findings/feedback from county level consultation in Narok	
14:10-15:00	Voices from national level SLM stakeholders	Contributions from *(presentations of 15 mins each)* • Private sector (KEPSA) • Research institutions (University of Nairobi)	
15:00-15:45		Discussion	
15:45-16:00		Summary of key recommendations and action points	
16:00-16:15	***Closing Remarks*** *(Stacey Noel, ELD Policy Working Group)*		
16:15	*Departure of all participants*		