

CHAPTER LAND, AGRICULTURE AND LIVESTOCK



Introduction

In Kenya, land means different things to different categories of owners. To farmers and pastoralists, land is a prized asset and a source of livelihood and therefore issues of access and control are key concerns. The elite consider land as a marketable commodity from which to make windfall profits through market speculation. The public, politicians and administrators view land as a sovereign imperative whose boundaries reflect a social, cultural and political identity. To development agencies, land provides goods and services required for people's welfare and prosperity. Conservationists perceive land as a fragile, ecological entity whose integrity is determined by the constant interactions of living and non-living things on the earth's surface. These perceptions translate into different, often competing interests and land was identified as one of the underlying causes of the 2008 post-election violence that rocked several densely populated regions of the country. This is because land is an important resource base that supports a number of natural resources and the site upon which economic, social and political aspirations find expression (Sifuna 2009). Its sustainable use, an enabling regulatory framework, efficient dispute resolution mechanisms and a modern land information system are therefore vital to attaining Vision 2030's economic and social pillar targets and to maintaining political stability which is a prerequisite to meeting all the goals set

out in the country's long term development blueprint.

Kenya covers an area of 591 958 km², which comprises 98.1 percent land and 1.9 percent water (GoK 2010b). Of the total land surface, 20 percent can be classified as medium to high potential arable land with the rest being classified as arid and semi-arid lands (ASALs). However, the arable land supports 80 percent of the human population while the ASALs support the remaining 20 percent in addition to 50 percent of the livestock and 80-90 percent of the wildlife resources in the country. Figure 6.1 shows the country's broad land classification.

Land is a critical resource for the survival of the Kenyan people and the contribution of agriculture to the economy is enormous (GoK 2007). About 67.7 percent of the country's population lives in rural areas and most derive their livelihood from agriculture. A lot of pressure is exerted by the fast growing population on the areas with high and medium productive potential.

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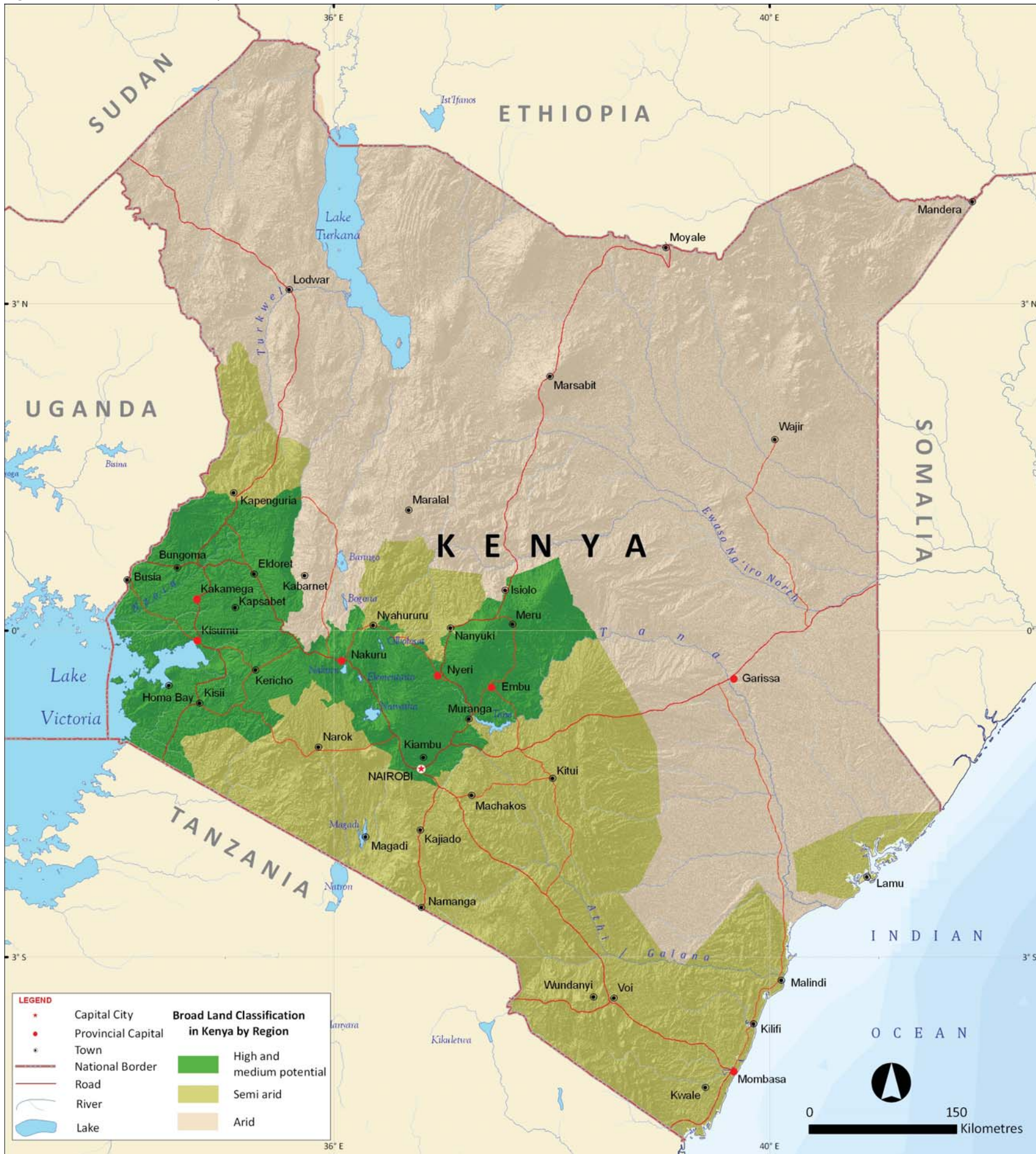
Agricultural land use in Mau.





Figure 6.1: Land classification in Kenya

Source: KNBS 2010



Over the last 30 years, human settlement has taken a complex pattern manifested by encroachment on water catchment areas and forests, rapid rural-urban migration and rising occupation of the arid and semi-arid lands (ASALs). The rapid rural-urban migration has led to unplanned informal settlements (slums) in the major urban centers and compounded waste management problems. The drift to the marginal areas has led to degradation of the fragile ASAL ecosystems, increased human-wildlife conflicts as well as land use conflicts between agriculturalists and pastoralists, with the latter two partly attributable to the prolonged absence of a national land use policy which would usher in the land reforms envisioned by Vision 2030 and the new Constitution.

Status of land resources in Kenya

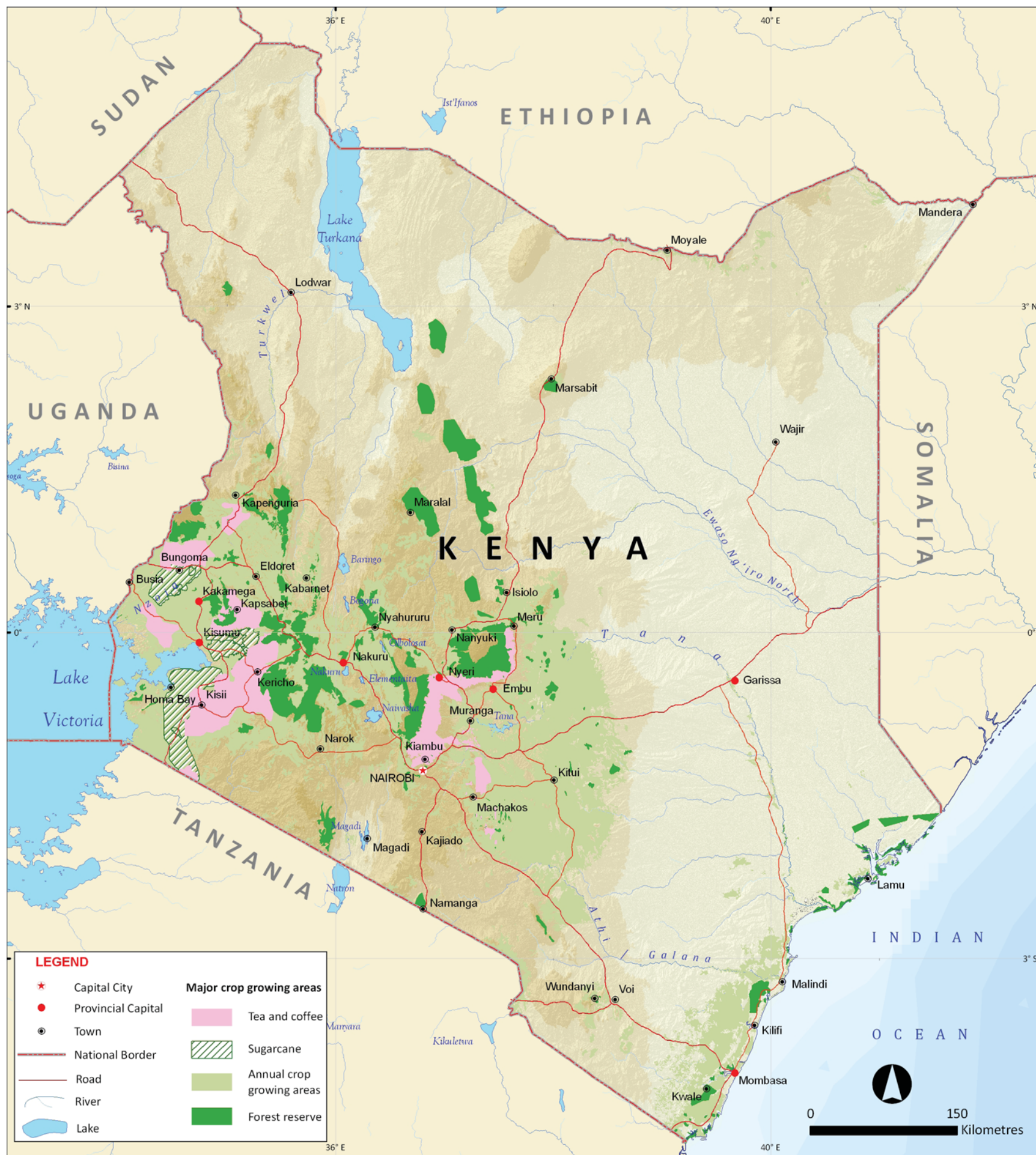
Land is a fundamental natural resource whose productivity directly impacts the country's economic growth and development. Most Kenyans derive their livelihood from land-based resources particularly through farming. The country's annual and major crop growing areas are highlighted in Figure 6.2.

Land use

Kenya's land use is largely pastoral in the semi-humid and semi-arid zones; and agricultural in the moist and humid zones. About 17 to 20 percent of the land has medium to high agricultural potential. Forests,

Figure 6.2: Annual and major crop growing areas

Source: DRSRS





Christian Lambrechts/UNEP

A tea plantation in Nandi Hills.

woodlands, national reserves and game parks together cover 10 percent of the total land mass (UNEP 2009). Land continues to be degraded with the situation projected to worsen in future. Droughts are also more frequent and severe, reducing per capita food production.

Agro-ecological zones

Kenya's agricultural productivity is determined by factors such as climate, hydrology and terrain (Jaetzold et al 2009). These agro-ecological factors also determine the suitability of an area for a particular land use and

these should ultimately inform the zoning processes that the land use law entrenched in Article 66 of the Constitution would provide for. Land's agricultural potential can be classified as high, medium or low. The high to medium potential land comprises about 20 percent of the country's total land area. Because these areas consistently receive more than 1 200 mm of rainfall annually and the soils are fertile, they are used for the intensive cultivation of a large variety of crops such as tea, coffee, sugarcane, maize and wheat.

Nevertheless, agricultural productivity is curtailed by a shortage of rainfall with only 17 percent of the country receiving average rainfall of more than 800 mm per annum, the minimum required for rain-fed agriculture. Figure 6.3 shows the country's agro-ecological zones while Table 6.1 highlights crop suitability for each of these zones.

The ASALs largely occupy northern and eastern Kenya as well as the southern margins of the central Kenya highlands. The semi-arid area covers about 20 percent of the entire land area while the arid area, which is characterized by true desert conditions, covers around 60 percent of the total landmass. Because incidences of crop failure in the ASALs are high, the predominant land-use systems are ranching, wildlife conservation and pastoralism although some perennial cash crops are cultivated.

Agriculture

The agricultural sector, which consists of industrial and food crop growing, horticulture, livestock, fisheries and the forestry subsectors, is the mainstay of Kenya's economy. Growths in the economic and

Table 6.1: General characteristics and crop suitability of the agro-ecological zones

Source: Jaetzold et al 2009

AEZ No.	Ratio of rainfall to potential evaporation (r/Eo)	Agro-ecological zone	Possible crops & cropping systems
0	> 1.20	Per humid	Forest zone
I	0.80-1.20	Humid	Tea-Dairy
II	0.65- 0.79	Sub-humid	Wheat, Maize, Beans, Irish Potatoes
III	0.50-0.64	Semi humid	Beans and other pulses, Maize, Wheat, Cotton , Cassava
IV	0.40-0.49	Transitional	Barley, Cotton, Maize Groundnut, Sorghum
V	0.25-0.39	Semi-arid	Livestock, beans pigeon peas, S. Potatoes Sorghum, Millet
VI	0.10-0.24	Arid	Ranching and cropping only under irrigation
VII	<0.10	Per arid	Range land

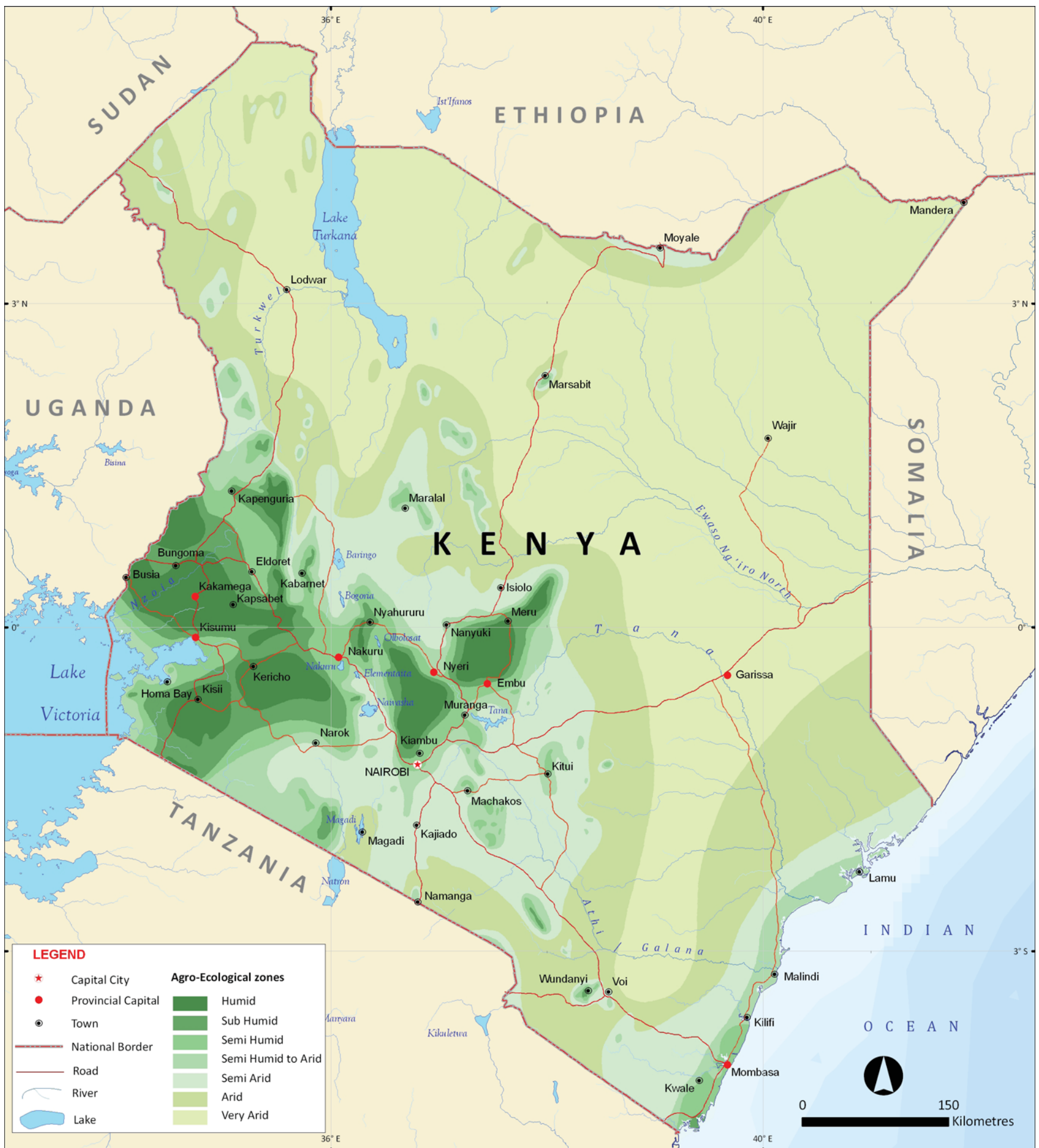


Figure 6.3: Agro-ecological zones

Source: NEMA 2010

agricultural sectors are therefore closely related. These trends are shown in Figure 6.4. This implies that agriculture, will, in the medium term at least, continue to determine whether the 10 percent annual economic growth rate anticipated by Vision 2030 is achieved.

Kenya has two agricultural production systems; rain-fed and irrigated. Rain-fed agriculture is entirely dependent on the bimodal rainfall in most of the country. There are two cropping seasons except in the very high-altitude areas. The performance of rain-fed agriculture varies spatially due to the country's diverse agro-climatic zones. In the humid, high-altitude areas, agricultural productivity and predictability are high. However, the population density in these areas is rising and

Maize crop failure in the Maasai Mara area due to lack of rain.



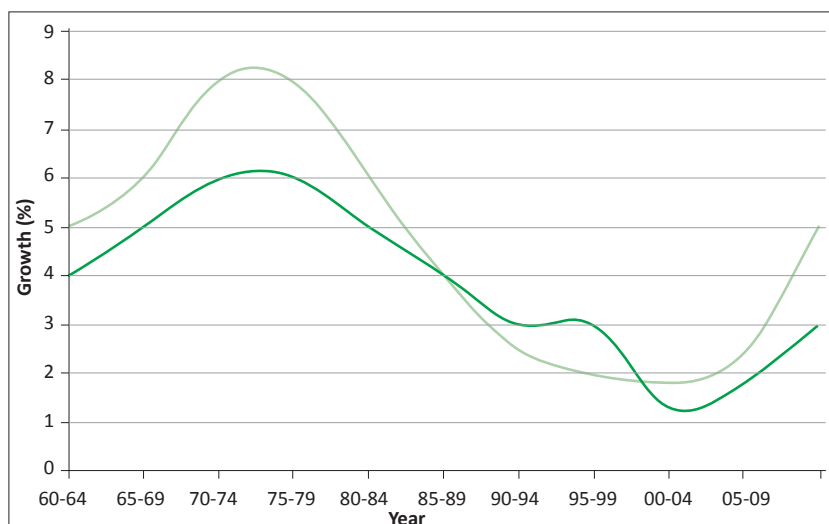


Figure 6.4: Trends in agricultural and economic growth, 1960-2008 Source: GoK 2010b

land is increasingly subdivided into small parcels that are uneconomical for farm enterprises.

In the medium altitude and moderate-rainfall areas, arable rain-fed farming is moderately suitable. However, there is a relatively high risk of crop failure due to the increased frequency of dry spells, and uneven rainfall distribution. Increasing productivity in these areas as envisaged by Vision 2030 will require better selection of crops, adoption of improved technologies, and better crop husbandry.

The ASALs have an average annual rainfall of 400 mm. Droughts are frequent and crops fail in one out of every three seasons. Most of the area is rangeland and is suitable for ranching and pastoralism. Farm enterprises comprise mixed crops and livestock. While there is ample land, farmers tend to grow crops that are not suitable for either this rainfall regime or the soils (ASDS 2010, Jäger et al 2005 and Gachimbi et al 2006). For it to be successful, agriculture in the ASALs therefore calls for better planning, careful selection of farm enterprises and greater investment in infrastructure.

Water and agriculture

Smallholder farmers account for 42 percent, large commercial farms 40 percent and government-managed schemes 18 percent (ASDS 2010) of the irrigated land in the country. Smallholder farmers often rely on low-cost, water-efficient irrigation technology to predominantly produce horticultural crops as these have a high export potential. The Mwea, Ahero, Pekerra, Bunyala and West Kano national irrigation schemes largely produce water-dependent crops such as rice.

Given the low national average rainfall of 400 mm, the government should encourage efforts to harvest and store adequate water for agriculture and other uses. Groundwater resources that can be exploited for agriculture also need to be assessed and quantified. More land can be utilized for crop cultivation by developing irrigation infrastructure in the ASALs.



A pastoralist herding cattle in Marsabit, northern Kenya.

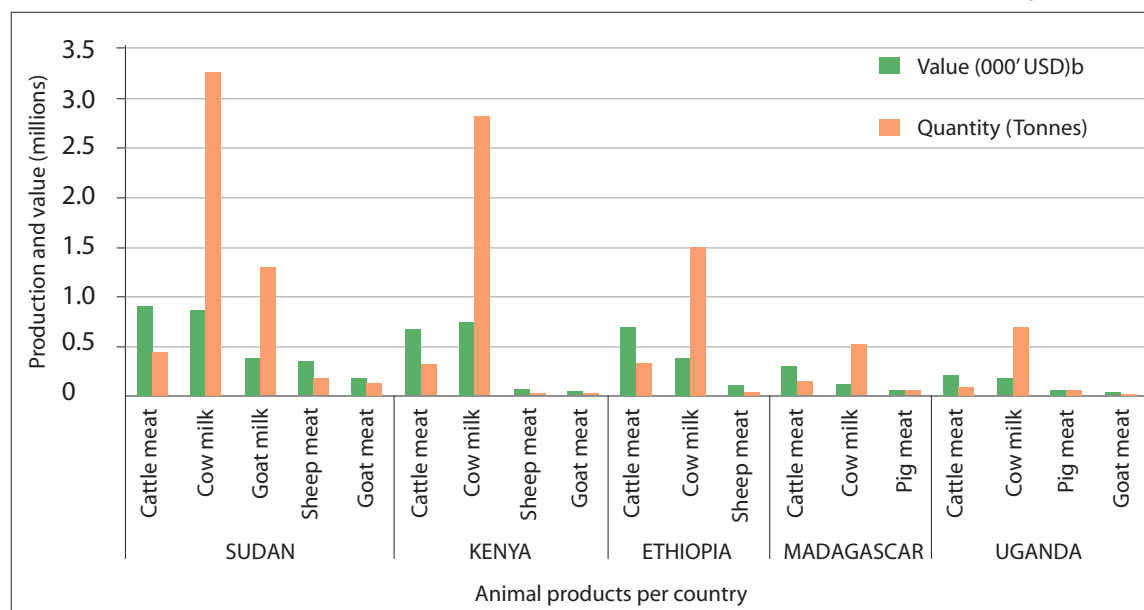
Livestock production

Livestock production plays an important economic and socio-cultural role among many communities in Kenya. The key livestock subsectors are beef and dairy cattle, sheep, goats, camels, pigs and poultry. The country's dairy cattle are estimated at 3.5 million heads. Dairy cattle are mainly kept in the medium to high-rainfall areas. The common dairy breeds are Ayrshire, Friesian, Guernsey, Jersey and cross-breeds. In 2008, milk production was estimated at 5.1 billion litres worth KSh 100 billion. At current effective demand, the country is self-sufficient in milk production.

The population of beef cattle is estimated at 9 million (KNBS 2010, MOLD 2009). The main beef species are East African Zebu, Boran, Sahiwal and cross-breeds. Although most of the country's beef is produced from rangelands, dairy cattle culls contribute substantially to the national supply. Even though beef production is affected by climate variability and animal diseases, the country produces about 320,000 tonnes of beef worth KSh 62.1 billion annually. In the East African sub-region, Kenya ranks second after Sudan in both animal product yields and value, followed by Ethiopia and Uganda. Figure 6.5 shows the production of animal products across the Eastern Africa region.

Figure 6.5: Regional animal production

Source: Ackello-Ogutre and Sikei 2008





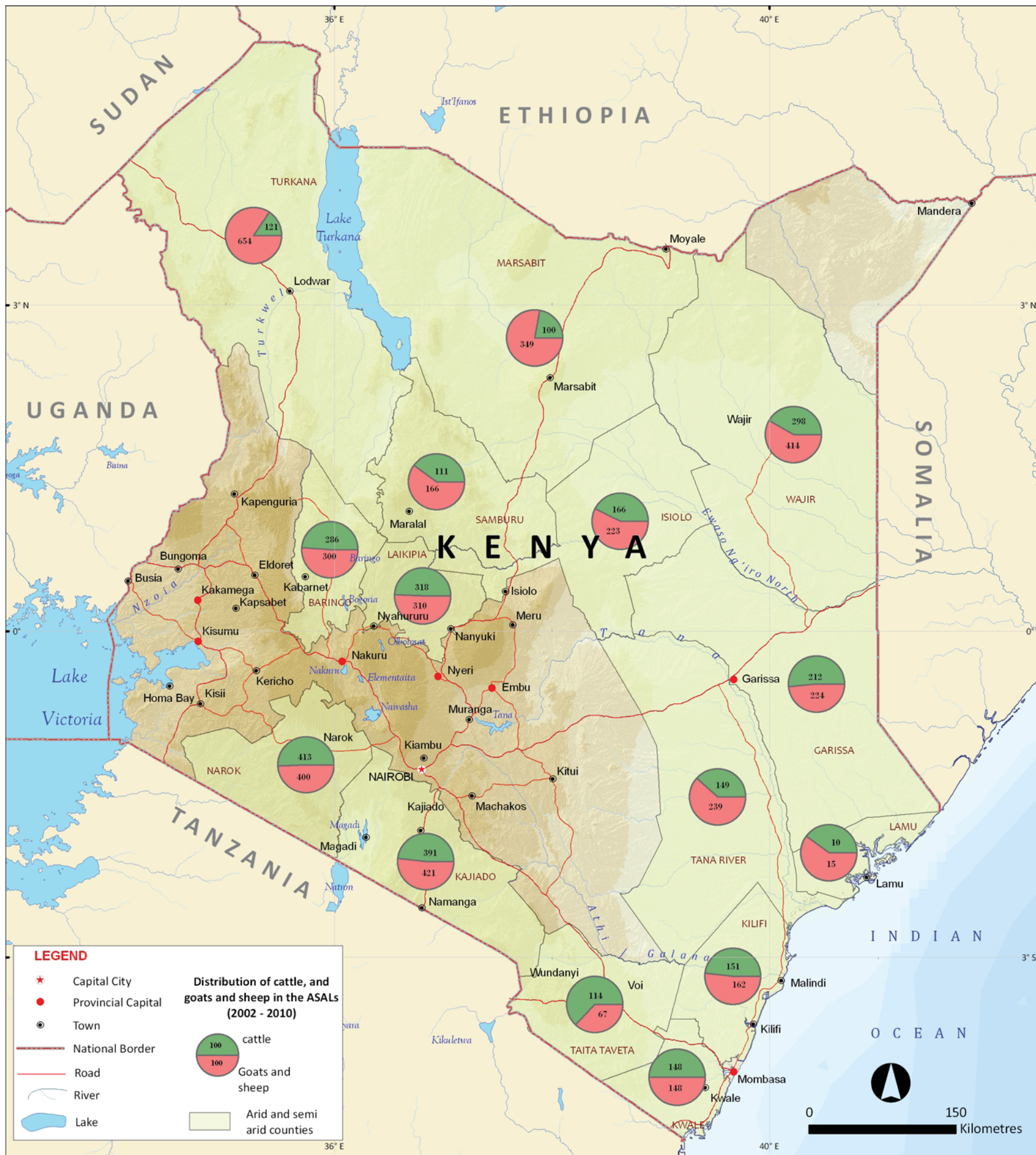
Cattle, camels, and goats at a watering hole.

Sheep and goats play a key role in the food security and incomes of pastoral households owing to their short-generation intervals, high adaptability and versatile feeding habits. The country is home to an estimated 27.7 million goats and 17.1 million sheep (GoK 2010a). Annual mutton and chevon production is estimated at 84 000 tonnes valued at about KSh 14 billion.

Kenya has an estimated 31.8 million chickens, 80.2 percent of which are indigenous while 19.8 percent are commercial layers and broilers (GoK 2010a). Other poultry types such as duck, turkey, pigeon, ostrich, guinea fowl and quail are becoming increasingly important. Annually, the country produces about 20 tonnes of poultry meat worth KSh 3.5 billion and 1.3 billion eggs worth KSh 9.7 billion.

Figure 6.6: Distribution of cattle, goats and sheep in Kenya's ASALs

Source: DRSSRS





A small-scale piggery in Limuru.

Pig rearing has withstood periodic fluctuations and is now relatively well-established in Kenya. It is estimated that the country produces 12 000 tonnes of pork worth KSh 1.2 billion annually. The country's distribution of goats and sheep (shoats), and cattle in the ASALs is presented in Figure 6.6.

Beekeeping (apiculture) is practised in most parts of Kenya, particularly in the ASALs. In addition to directly contributing to household incomes, bees play an important role in plant pollination that is central to crop production. The country produces an estimated 14 600 tonnes of honey and 140 tonnes of beeswax annually which are collectively valued at KSh 4.4 billion. Due to the low investment and variable costs involved, beekeeping is becoming increasingly popular in rural areas.

Ranching and pastoralism are the predominant land use systems in the ASALs such as Kalama Group Ranch in Samburu shown here.



Camel keeping is mainly practised in northern Kenya. Camels produce milk, meat, are a source of income and serve as pack animals. The country is home to a camel population of 2.9 million (GoK 2010a) which produce 7 000 tonnes of meat worth KSh 1 billion, and 200 million litres of milk worth KSh 2 billion annually. Because camels are probably the most versatile of the domestic animals, camel keeping is gradually extending to the South Rift region and is expected to expand to other parts of the country in the coming decades.

While livestock production is associated with positive livelihood outcomes that are indispensable to meeting the economic aspirations set out in Vision 2030, excessive pressure on vegetation by livestock has adversely affected the production potential and carrying capacity of land in Kenya. Indeed, the high livestock population, especially in the fragile ASALs, has been associated with increased land degradation.

The growth of the pastoralist population in Kenya and the increase in livestock population density have led to the extension of grazing activity into semi-arid marginal lands and forests, causing severe degradation in these areas. Heavy losses of livestock due to diseases, pests and drought have also continued to adversely affect animal production and also pose a threat to human health.

Scale of production

Agriculture is predominantly carried out on a small-scale and mainly in the high-potential areas. Production is carried out on farms averaging 0.2-3 ha, mostly on a commercial basis. This small-scale production accounts for 75 percent of the total agricultural output and 70 percent of the marketed agricultural produce. Small-scale farmers account for over 70 percent of maize, 65 percent of coffee, 50 percent of tea, 80

percent of milk and 70 percent of beef production. However, adoption of improved techniques such as the use of hybrid seed, concentrate feeds, fertilizer, pesticides and machinery by small-scale farmers is relatively low. Adoption of modern farming practises therefore has the potential to substantially increase the productivity of these farmers and to improve their welfare, enabling the Vision 2030 poverty alleviation goals to be met faster.

The rangelands' small-scale livestock production system predominantly consists of pastoralists. Livestock herds are typically large because of communal grazing and there is a low use of purchased inputs like feed, drugs and artificial insemination. Rather than being market-oriented, production is mainly for subsistence but improving market access for pastoralists, encouraging value addition, infrastructural development and streamlining the institutional and fiscal framework in line with the Vision 2030 aspirations would go a long way in integrating

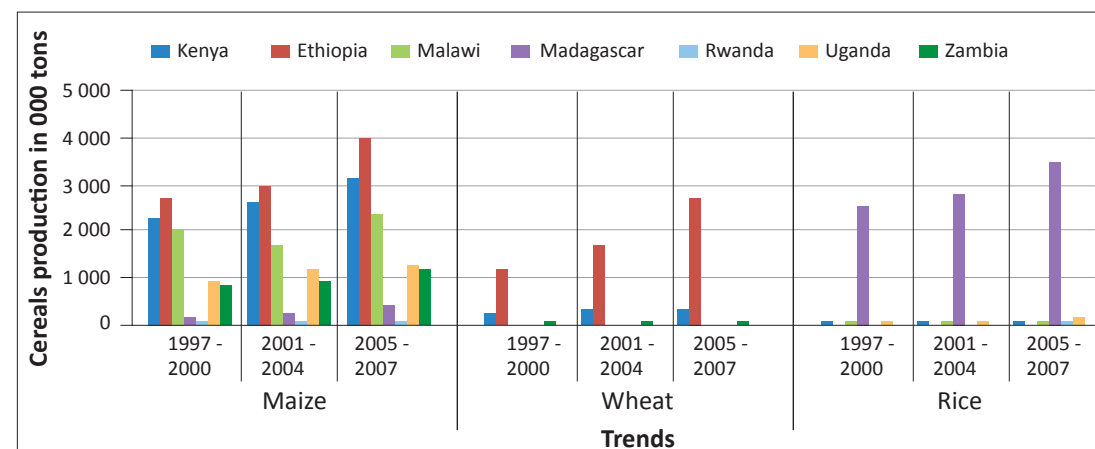
this sector into the mainstream economy. Providing extension services, encouraging investment in livestock processing facilities, encouraging regional, national and local initiatives to end cattle rustling and planning and enforcing disease free zones would also address the security, disease and nutrition constraints to increased livestock productivity.

Medium-scale farms range from 3 to 49 ha in size. Farmers in this category are more receptive to technology use and practise more viable commercial agriculture by investing in inputs, marketing their produce and taking loans for farm development.

In Kenya, large-scale farming is practised on farms averaging about 50 ha for crops and 30 000 ha for livestock ranches. The large-scale farming subsector, which accounts for 30 percent of marketed agricultural produce, mainly involves growing crops such as tea, coffee, maize and wheat in addition to keeping livestock for commercial purposes. In keeping with the objectives set out in Vision 2030, there

Figure 6.7: Regional trends in cereals production

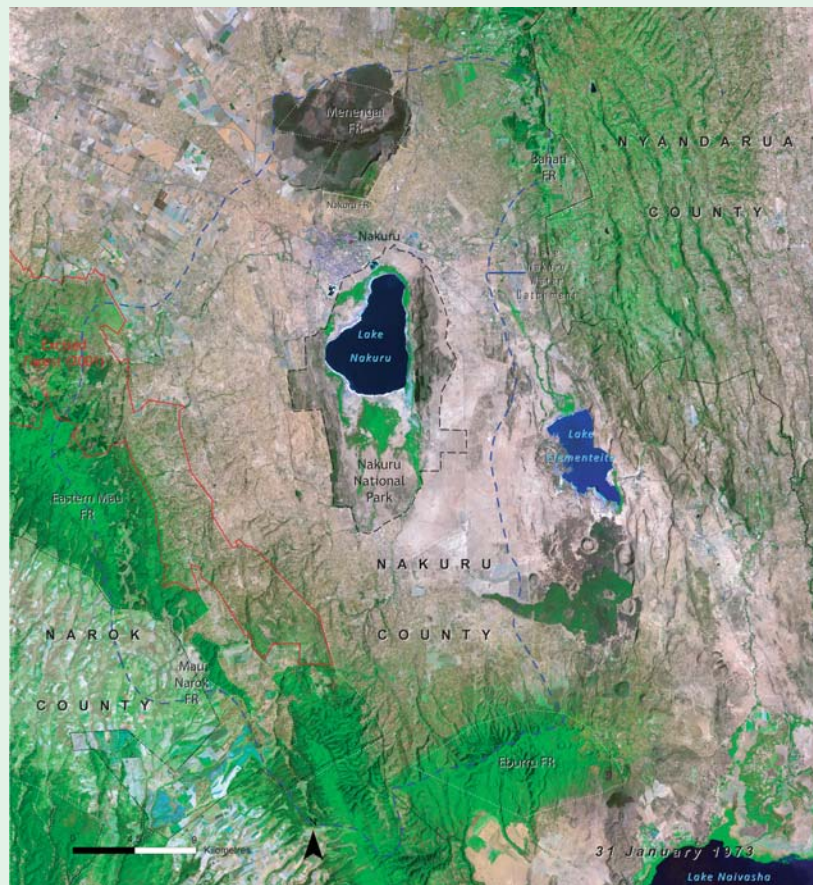
Source: ASDS 2010



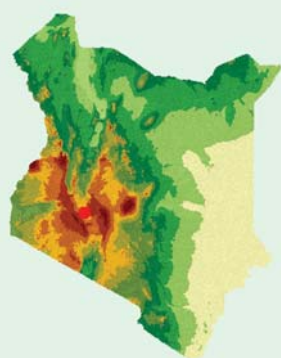
is need to reduce input costs and increase the acreage of land under irrigation, inculcate good farming and farm management practices and to encourage the use of improved technologies in order to increase productivity per land unit. This is because these factors have been held responsible for the declining cereal yields in Kenya, especially in comparison with countries like Ethiopia and Madagascar. Regional trends in the production of cereals are depicted in Figure 6.7.

Land degradation is a common feature in the Eastern and North Eastern parts of Kenya.





Land cover degradation in the Lake Nakuru catchment in 1973 and 2010



Box 6.1: The degradation of Lake Nakuru catchment area

Lake Nakuru has a total area of 188 km². The park is a habitat for over 450 bird and 56 mammalian species and hosts the world's largest concentration of the Lesser flamingo as well as lions, leopards, rhinoceros, and buffaloes which make Kenya a highly valued tourist destination.

The loss of natural vegetation, particularly forests, in Lake Nakuru's watershed threatens the lake's water quality and water balance. Between 1986 and 2003, roughly one-fifth of the forested area in the upper reaches of the River Njoro catchment was lost. Another analysis found that just under half of the dense vegetation cover in the Lake Nakuru basin was lost between 1973 and 2003. The images show the land cover in the lake's catchment in 1973 and 2010.

Source: UNEP 2009

Threats to land, agriculture and livestock

The threats to the land resource include land degradation from soil erosion, declining soil fertility, pollution, land cover change, low agricultural productivity because of the low adoption of appropriate technologies, excessive pressure from livestock as a result of overstocking and an outdated policy and legal framework.

Land degradation

The important land degradation issues Kenya is grappling with range from escalating soil erosion, declining soil fertility, agrochemical pollution, salinization of land and land cover conversions. Although in 1997, 64 percent of Kenya's landmass was subject to moderate land degradation and about 23 percent to very severe degradation problems, the later had increased to nearly 30 percent in the early 2000s with the cultivated areas and grasslands being particularly affected (Muchena 2008, Bai et al 2008). This degradation manifests itself as gully erosion

with the problem appearing to be most pronounced in the Eastern and North Eastern parts of Kenya where 12.3 percent of land suffers from severe degradation, 52 percent from moderate degradation and 33 percent is vulnerable to land degradation. The expansion of cropping into fragile areas such as forests is responsible for much of this degradation. A case study of Lake Nakuru, which is contained in Box 6.1, demonstrates this point well.

An estimated 12 million people (UNEP 2009) or just under one-third of the country's population depends directly on land and as the country's population continues to grow, the resource is expected to become increasingly degraded unless urgent remedial measures are taken. And, the steady decline in per capita land holding, rising land degradation as well as the fragmented, complex and pluralistic land tenure regimes pose serious food security and environmental concerns. These considerable challenges are likely to threaten the economic, social and political stability of the country and to concomitantly negatively impact the delivery of Vision 2030.

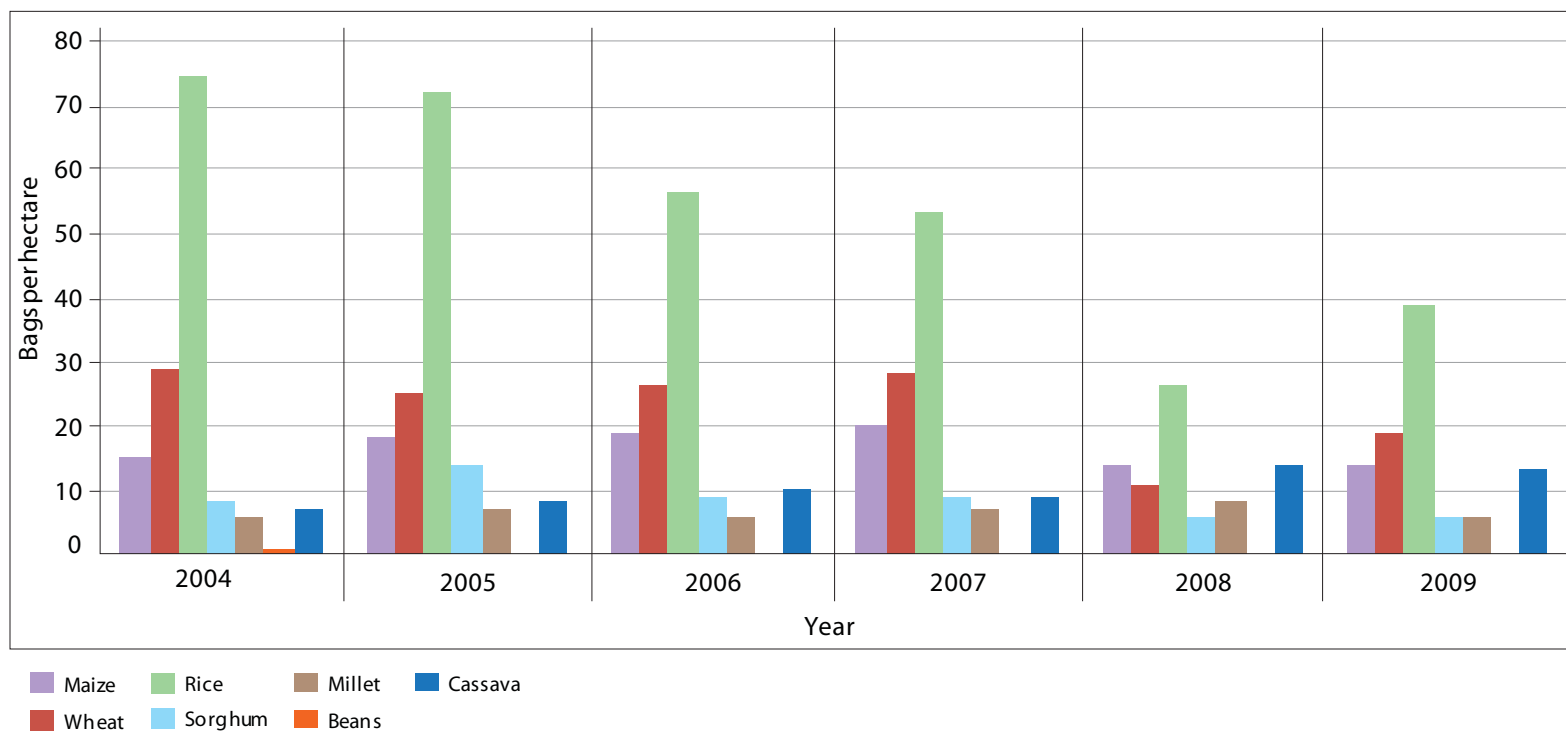


Figure 6.8: Average crop production per hectare, 2004-2009

Low agricultural output

Agricultural output continues to be impeded by various challenges such as soil erosion, loss of agro-biodiversity, soil nutrient depletion, low agricultural output and productivity, an inappropriate legal and regulatory framework and overreliance on rain-fed agriculture (GoK 2007 and GoK 2009). The productivity levels for most crops are significantly below potential as these have either remained constant or are in decline. Figure 6.8 shows the average crop production per hectare over the 2004 to 2009 period. The low agricultural output and productivity results from unsustainable land use practices and the low adoption of appropriate technologies such as high-yielding crop varieties, adequate application of fertilizer and manure and use of efficient tillage and cultivation methods. These have been exacerbated by the high cost of inputs and productive resources such as fertilizer, pesticides and irrigation infrastructure.

Outdated legal and regulatory framework

An outdated and fragmented legal and regulatory framework still remains a challenge to the development of the agricultural sector yet, because this is the foundation of the economy, it is indispensable to the attainment of the objectives of Vision 2030's economic pillar. In particular, the existing regulatory framework—of which the antiquated Agriculture Act (Cap. 318) is an integral part—is not fully supportive of private sector-led agricultural development in the liberalized economic environment. Further, inappropriate land-use practices and disjointed sectoral environmental policies have encouraged land fragmentation, extension of residential developments into agricultural land, an abundance of idle land, deforestation, encroachment into fragile ecosystems such as wetlands and forests as well as cultivation on river banks. The finalization of the National Land Policy in 2009 and the inclusion of comprehensive land provisions in the new Constitution are important first steps. The challenge will be for the executive arm of government and the National Assembly to enact and operationalize the land laws specified in the Constitution's Fifth Schedule within the stipulated timeframes.

Unsustainable increases in livestock population

Excessive pressure on the vegetation by livestock is a considerable problem that has adversely affected the production potential and carrying capacity of Kenya's ASALs. The growth of the pastoralist population and subsequent increase of the livestock population have led to the extension of grazing activity into semi-arid marginal lands and forests, causing severe degradation and reduced livestock yields. The impact of grazing in the drier areas is most evident around watering points and settlement areas which are grazed until they are bare leading to malnourished animals and even livestock deaths in arid areas such as Baringo. The cumulative effect of extensive land degradation has reduced the carrying capacity in all the country's agro-ecological zones leading to soil erosion and depletion of the natural seed banks in the soil such that even with adequate rainfall, little grass or other palatable vegetative material regenerates.

Livestock diseases and pests affect animal production and marketing and also pose a threat to human health. Specifically, they cause heavy losses through livestock deaths, reduced livestock and human productivity and a loss of markets for products. The incidence of transboundary diseases such as foot and mouth, contagious bovine pleuropneumonia, lumpy skin disease, trypanosomiasis, East Coast fever, brucellosis, pestes des petits ruminants (PPR), contagious caprine pleuropneumonia, rabies, Newcastle disease and Gumburo disease continues to be high, adding some urgency to the need to establish the disease free zones alluded to in Vision 2030. Emerging and re-emerging zoonotic diseases like Rift Valley fever, avian flu and bovine TB also need sustained surveillance so there is need to upscale capacity building in the relevant areas.

Recent severe droughts—many of which are climate change-related—have accelerated the degradation of land in Kenya and reduced per capita food production. As a largely human-induced phenomenon, climate change calls for multi-sectoral partnerships in tackling its varied negative impacts that include energy, water and food scarcity which in turn fuel natural resource conflicts. The scarcities and attendant conflicts cyclically aggravate poverty and environmental degradation, making the poverty alleviation goals set out in Vision 2030 more elusive.



Watering livestock in Marsabit.

Endowment value of the land, agriculture and livestock resources

Land

Because land provides humans with a habitat and livelihood means, it is a principal asset for both survival and development. This is because people's livelihoods, culture and the economy depend on a flow of multiple ecosystem services which result from the complex interactions among the physical, biological and chemical environments of which land is an inalienable part. The effective management of land is therefore critical to attaining the aspirations set out in the social, economic and political pillars of Vision 2030.

Agriculture

The agricultural sector, including livestock production, directly accounted for between 21.5 to 23.5 percent of GDP in the period 2006 to 2010 (GoK 2011). In addition, the sector contributes approximately 65 percent of total export earnings, 18 percent of formal employment and 62 percent of informal employment and supplies 70 percent of the raw materials to the agro-based industries (GoK 2010). Despite the various challenges that bedevil the sector, agriculture is the mainstay of the Kenyan economy. This implies that addressing these challenges will enable the sector to contribute to the 10 percent annual economic growth rate specified in Vision 2030.

Livestock

Livestock is a source of livelihood for Kenyans in virtually all the regions of the country. Because 80 percent of the country is too dry to support

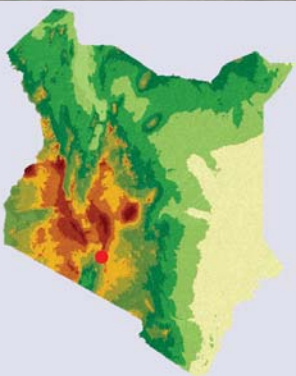
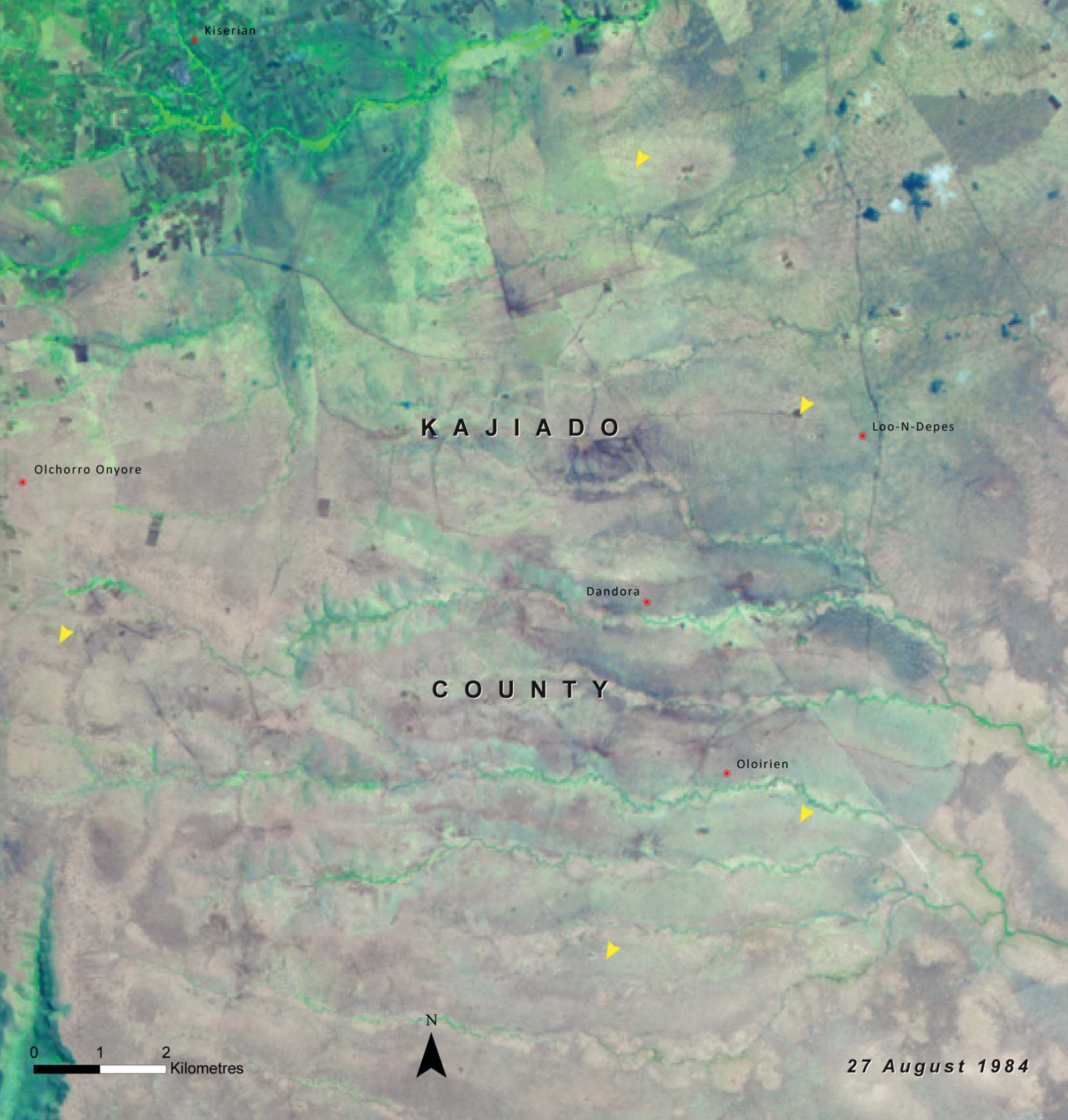
cultivation agriculture, the households which inhabit the ASALs rely extensively on livestock which, in addition to meeting their food needs, accounts for about 90 percent of the total employment and over 95 percent of household incomes. At the national level, the subsector provides employment to about 10 million people and accounts for 4.4 to 5.4 percent of the GDP. In addition, the subsector supports the feeds, drugs, vaccines and equipment manufacturing industries and provides raw materials to the agro-processing industries (GoK 2010). And, because the subsector's enormous potential has not been fully tapped, it has the ability to considerably bolster the agricultural sector with the benefits trickling through to the economic, social and political pillars of Vision 2030.

Opportunities for land, agriculture and livestock to deliver Vision 2030

In spite of the many challenges and constraints limiting land, agricultural and livestock growth in Kenya, many opportunities for both building dynamic land-based resources' management systems and delivering Vision 2030 exist.

Sustainable land management

Sustainable land use can be attained and enforced using a robust national land use regulatory framework while land degradation can be tackled through a range of mechanisms. These include appropriate soil and water management strategies, reclamation of drylands, protection of forests and other critical ecosystems, agroforestry and promotion of conservation agriculture and water-harvesting technologies.



Greening Kajiado – In the past, Kajiado County, located to the south of Nairobi City, formed one of the largest contiguous pastoral lands occupied mainly by the Maasai community. The area’s vegetation

primarily consisted of grassland, shrubs, and thickets. Nomadic pastoralism—the traditional way of life of the Maasai—was the dominant land use. Currently though, subdivision of this land and eventual change



of ownership has resulted in a change in the vegetation characteristics and land use. As is evident from the above two images, within a span of 16 years (1984-2010), the vegetation changed from a brownish to

a more lush, greener tone. This is because the new land owners are aggressively promoting tree farming. The yellow arrows show those areas that have changed from barren to green.



Christian Lambrechts/UNEP

A dam in Kenya's ASALs provides water throughout the dry season.

Increasing agricultural and livestock yields

Yields of crops and livestock are far below their optimum with those of maize, sugar cane and dairy being a mere one-tenth of the global average. Tripling national average yields of major crops and livestock is therefore easily achievable through the adoption of appropriate technologies such as crop and livestock biotechnology and integrated soil fertility management. Other initiatives that can spur agricultural and livestock productivity are value addition and improving access to agricultural inputs and extension services.

Increasing irrigated agriculture

Irrigation, particularly in the high- and medium-potential agricultural areas and ASALs should be substantially scaled up by developing the largely untapped potential of the Tana and Athi river basins and the country's 253 km Lake Victoria shoreline. Further, communities and households should be encouraged to harvest and store sufficient water for domestic and agricultural use. Groundwater resources, that can be used to supplement surface water and rain water-harvesting, need to be urgently assessed and harnessed. These initiatives should be complemented by developing irrigation infrastructure in the ASALs and adopting low cost, water efficient drip irrigation systems. Because intensified irrigation can increase agricultural productivity fourfold and, depending on the crops grown, increase incomes tenfold (ASDS 2010), the benefits would far outstrip the costs and, the positive outcomes of this for Vision 2030 would be enormous.

Value addition

Value addition in this context consists of enhancements to a product early on in the supply chain. It includes farm-level quality improvements,

processing, branding, quality certification and accreditation that fetch a higher price for the product. It is estimated that 91 percent of Kenya's total agricultural exports are in raw or semi-processed forms. Thus, by not adding value to its produce, the country loses out on billions of potential earnings. The potential for adding value to products such as tea, coffee, pyrethrum, milk, beef, hides and skins, fruits and vegetables—and for transforming Kenya into a rapidly industrializing middle-income nation by 2030 and the positive knock on effect this would have on impoverished Kenyans' welfare—remains largely untapped.

Promotion of forest conservation and farm forestry

Forestry contributes to improved agricultural productivity through conserving soil and water and improving soil fertility. The destruction and degradation of the country's forests has resulted in increased rates of flooding, landslides and siltation of rivers. Because of the positive correlation between forest cover and agricultural productivity, it is important to step up efforts to raise the country's forest cover from the current 1.7 percent to the desired 10 percent level by intensifying reforestation efforts in Kenya's gazetted forests and promoting the benefits of small- and large-scale tree farming and agroforestry. Initiatives aimed at introducing indigenous and commercial tree species in the ASALs in order to control desertification and improve livelihoods also need to be urgently undertaken. Chapter 5 contains a detailed discussion of these issues.

Conclusion and recommendations

Agriculture is the largest sector of Kenya's economy and is one of the key sectors that have been earmarked to deliver the 10 percent annual economic growth rate envisaged under Vision 2030's economic pillar.

The following recommendations would help to actualize this goal and to prevent land conflicts in the country:

- **Overhaul the legal and regulatory framework.** In particular, there is need to enact a land use law within the timeframes stipulated by the Fifth Schedule of the new Constitution and to overhaul the operative Agriculture Act (Cap 318) which does not reflect the realities of the liberalized environment within which agricultural enterprises operate. The new agriculture law should, of course, be preceded by participatory formulation of a national agricultural policy aimed at reviving the fledgling but crucial agricultural sector.
- **Sustainable land management in the high and medium potential areas should be encouraged.** Policies geared towards reversing land degradation in the high and medium potential agricultural areas should be tackled through appropriate soil and water management strategies, reclamation of drylands through irrigation, protection of forests and other critical ecosystems, agroforestry, promotion of water-harvesting technologies and of conservation agriculture as the latter is associated with higher crop yields, reduced soil erosion and sustainable land management. Conservation agriculture is also increasingly promoted as one of the ways of tackling climate change.
- **Promotion of farm forestry is a priority** and efforts in forestry development should focus on expanding tree cover in industrial plantations, on farms and in urban and local authority and national forests in order to restore environmental integrity. A formal policy on farm forestry and conservation of the natural environment needs to be finalized. Initiatives aimed at introducing commercial tree species into the country's vast ASALs to control desertification and improve livelihoods need to be fast-tracked

in order to reverse environmental degradation and provide the pastoralist communities with alternative livelihood sources.

- **Policies geared towards efficient and effective natural resource management in the ASALs needs to be promoted** as the communities are at risk of becoming trapped in a downward poverty spiral. Unless this is urgently instituted, this may force them to eventually migrate out of these marginal areas to other already densely populated rural and urban areas, increasing the pressure on these. Specific policy measures should be formulated to thwart this risk and should include:
 - **Local and national policy makers should initiate and support development of production chains for a number of products with considerable commercial potential.** These would encourage intensification of livestock production with emphasis on beef, milk and milk processing, development of mixed crop-livestock production systems (zero-grazing, optimizing manure management as well as utilization and intensification of fodder production) and the use of low cost irrigation systems for high value crop production and diversification.
 - **Private sector agricultural investment should be stimulated through the development of basic infrastructure** including a rehabilitated road network and encouraging appropriate water harvesting and other modern technologies through fiscal incentives. This is expected to lead to more sustainable natural resource management practices and improved livelihoods which will in turn facilitate the attainment of Vision 2030's economic, social and political pillar goals.

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